AN ECONOMIC AND INDUSTRY ASSESSMENT OF THE VALUE OF THE TERRESTAR CORPORATION COMMON EQUITY INTEREST AND THE UNDERLYING VALUE OF ITS 1.4 GHZ SPECTRUM AT BANKRUPTCY

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DISCLAIMER

This engagement has been conducted according to the terms of our engagement letter of August 2017. The agreement is with the members of the stakeholder group that are signatories to the engagement letter and identify themselves as the Victimized Minority Common Shareholders of TerreStar Corporation. This report satisfies the current obligation under the engagement letter and the retainer amounts provided therein. Any subsequent work request will require additional retainer and fees, and if it evolves to a litigation engagement, will require direct retention by the representing legal counsel.

This report is a response to the request made by such shareholders to estimate the value of the 1.4 Spectrum. Accordingly, we have confined the scope of this project to the valuation of the 1.4 Spectrum, and by extension to the valuation of TerreStar Corporation, at or around the time of the TerreStar Corporation bankruptcy confirmation hearing October 10, 2012. Our opinion is based on economic, monetary, regulatory, market and other conditions existing and which can be evaluated as of the date identified hereof.

The information contained in this report has relied on publicly available information obtained by Ivan Arteaga, CFA, MBA, L.L.C., which includes, but is not limited to company disclosures, SEC filings, FCC filings, consideration of peer company strategic plans, and other public information. Accordingly, our access to company budgets, estimates, and expectations as to past, current, and future plans, has been obtained, when available, from such public information, and not from the company directly. In determining how to weigh such information in our analysis a determination has been made as to the believability and accuracy of such information. Such information has been relied upon without assuming an obligation for independent investigation or verification regarding the accuracy, completeness and fair presentation of all such information, and the conclusions contained herein are conditioned upon such information (whether written or oral) being accurate, complete and fair in all respects. The estimates, budgets, and projections contained herein, may or may not be achieved. Differences between projected results and those achieved may be material. Neither Ivan Arteaga, CFA, MBA, L.L.C., nor any of its advisers or contractors, take any responsibility for the accuracy or completeness of any of the company material.

Furthermore, it should be understood, that while developments after the valuation period may deserve different conclusions, Ivan Arteaga, CFA, MBA, L.L.C. has not accepted obligation for incorporating subsequent results into the scope of the current engagement. Ivan Arteaga, CFA, MBA, L.L.C. does not have any obligation to update, revise or reaffirm its estimates.

Ivan Arteaga, CFA, MBA, L.L.C. has not been furnished with any of the unredacted copies of valuations submitted in the bankruptcy proceedings for the TerreStar Corporation, or in the separate bankruptcy of its subsidiary TerreStar Networks. These include, but are not limited to, the Blackstone valuation expert's report, the Jefferies valuation report, and the RKF report. Accordingly, such unavailable information has not been incorporated into this analysis.

In arriving at our opinion, we have, among other things: (i) examined the record of the bankruptcy, (ii) evaluated precedent transactions, including FCC auctions and secondary sales,

(iii) investigated the background presented in company disclosures to shareholders, the press and the FCC, (iii) held discussion with industry participants to assess additional background and unique circumstances, (iv) compared the relative differences in characteristics and conditions of respective licenses and terms in the various spectrum transaction analyzed, and (v) conducted such other financial studies, analysis, and investigations as we deemed appropriate.

The estimates and conclusions presented, herein, have involved judgment regarding selection and amount of evidence to be examined. The preparation has been designed to provide reasonable assurance with respect to our conclusions. Due to the inherent limitations of any such engagement, and because it is impossible to examine every existing relevant piece of evidence, there is a risk that despite our best efforts there will exist a material difference between our estimates and the actual reality. To be explicit, this engagement has been conducted on a best efforts basis and we do not and cannot assume liability for losses or other consequences suffered, whether direct or consequential, arising out of reliance on our analysis. We believe the approach employed was appropriate, especially in light of the constraints and scope of available data. Additionally, the conclusions herein are limited to the scope of examination conducted and the periods of reference. It is possible the analysis would be different if expanded, or if additional data were presented.

Ivan Arteaga, CFA, MBA, L.L.C., did not attribute any particular weight to any analysis or factor considered by it, but rather made qualitative judgments as to the significance and relevance of each analysis factor. Accordingly, this analysis must be considered as a whole. Considering any portion of this analysis, and/or factors presented herein, without considering all analysis of factors holistically, could create a misleading and/or incomplete view of the process underlying the conclusions expressed herein.

It is understood that our opinion is for the use and benefit of the Victimized Minority Common Shareholders of TerreStar Corporation. We expressly disclaim any undertaking or obligation to advise any person of any change in any factor or matter affecting our opinion, of which we become aware, after the date hereof. Any distribution or presentation of the contents of our work, either in summary or other fashion, must be accompanied by this discussion of the appropriate use of our analysis.

TABLE OF CONTENTS

I. INTRODUCTION

The TerreStar Corporation ("TSC") emerged from bankruptcy effective March 12, 2013. Upon this effective date, remaining TSC creditor claims were resolved and the common equity was extinguished. The series A and B preferred shareholders in TSC received all of the equity in the emerged company ("TSC newco"). The minority equity shareholders lost all of their investment.

We have been retained by certain minority shareholders holders of TSC who call themselves the Victimized Minority Shareholders Of The TerreStar Corporation (the "minority shareholders"). They have retained us to perform a valuation of TSC, at or around the effective date, to better assess the fairness to the minority shareholders of the bankruptcy plan (the "Plan"). This requires a valuation of the right to use the 1.4 GHz of nationwide terrestrial spectrum, pursuant to 64 Federal Communications Commission ("FCC") licenses ("the 1.4 Spectrum"). These licenses represent substantially all of TSC's value at the effective date.

A. The History Of The Bankruptcy Proceedings.

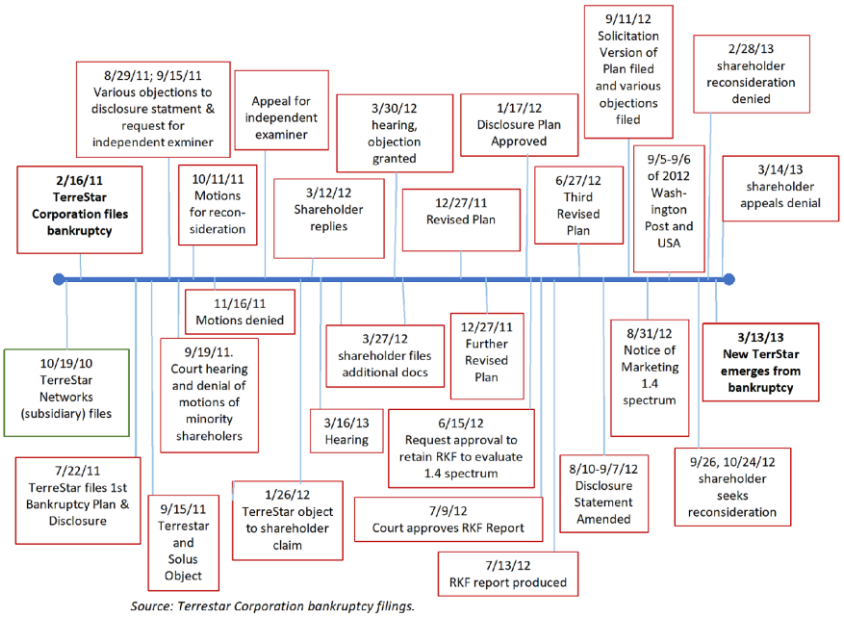
The history of the bankruptcy observes the interest of the debtors, i.e. TSC, along with the controlling stakeholders, who submitted and supported the Plan [1], in conflict with those of the minority shareholders, who have opposed the Plan. The TSC-control group Plan sought a

[1] These controlling stakeholders, i..e. Harbinger Capital Partners (succeeded by West Face Long Term Opportunities Long Term Global Master, L.P., Dish Network Corporation, Highland Capital Management, L.P. and Solus Alternative Asset Management, L.P., who are DIP lenders,

restructuring based on a 1.4 Spectrum valuation in a range of $160 to $235 million, or approximately $0.06-$0.09 per MHz-POP [2], falling far short of existing claims. The minority shareholders, in opposing the Plan, argued that it severely understated 1.4 Spectrum that was otherwise valuable enough to provide meaningful residual value to the equity shareholders (including the minority shareholders).

For the benefit of context, and to highlight the volume of exchange between TSC, with its control group, and the minority shareholders in opposing the Plan , we provide a summary time-line of key proceedings and exchanges in the TSC bankruptcy.

Exhibit 1: Timeline Of The TerreStar Corporation Bankruptcy Proceeding



Source: Terrestar Corporation bankruptcy filings.

Bridge Lenders, and owners of control positions at various levels of the capital structure

[2] TerreStar Corporation, et al., Debtors. *TSC Declaration of Steven Zelin in Support of Confirmation of theThird Amended Joint Chapter 11 Plan of TerreStar Corporation, et. al. Exhibit B of Debtors' Memorandum Of Law In Support of Confirmation…* United States

The court provided a good summary of the debtor's position in its oral opinion at the confirmation hearing on October 10, 2012. The relevant assumptions the TSC-control group submitted on valuation that the court relied on to confirm the plan, are summarized here. Specifically, the court accepted the TSC-control group position that (1) there are certain characteristics of the 1.4 Spectrum that impose significant limitations on its current use that render it unsuitable for mobile broadband applications and limit the use of that spectrum to low bandwidth and low power applications based on current technology, (2) the spectrum cannot be used across a significant portion of the United States due to interference concerns and sharing regulations, (3) the spectrum exists in an unfavorable configuration that renders it less favorable for use with 4G technology and high-bandwidth applications, and that (4) the spectrum must demonstrate substantial service by April 20, 2017 in order to remain compliant with FCC requirements, thereby imposing another hurdle on anyone who wants to use spectrum. Together these supported the TSC-control group claims of a limited use constraint that confined the 1.4 Spectrum to low-value business models.[3]

B. Our Conclusions.

In conducting our analysis of the 1.4 Spectrum value, we took into account relevant public information. We have reviewed vast amounts of FCC data including license filings, company disclosures, SEC filings, and other public information. We have evaluated the record of the bankruptcy, respective filings, and declarations and testimony of various relevant parties, to

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Bankruptcy Court. 11-10612 Doc 650. Filed 10/05/12. Para 17, pp. 58 of 87.

[3] See court's oral opinion in the transcript of the confirmation hearing: (TerreStar Corporation, et al. Debtors. Hearing re: Doc. #513 Confirmation Hearing. [New York] United States

extract the underlying support for their valuation position regarding TSC. Accordingly, we have assessed the reliability of the facts presented, and weighted them as we have assessed they deserve. Our effort has been produced as independent agents working for the integrity of the valuation. Accordingly, we conclude that:

- The 1.4 Spectrum is mobile broadband spectrum. Accordingly, any valuation of the 1.4 Spectrum that relies on an examination of relative comparable precedent transactions, should be primarily in this universe. Characteristics that potentially impact the usability or cost of usability of this license band, should be addressed with adjustments that reflect the impact of these factors, considered holistically, compared to the ideal case.

- Mobile broadband spectrum values in the U.S. were rising and were likely to continue to rise, if not accelerate, during the analysis period. Market conditions then reflected a state of escalating perceptions of scarcity and spectrum demand in the industry.

- The value of the 1.4 Spectrum falls in a range between $690-$936 million or $0.28 per MHz-POP to $0.38 per MHz-POP.[4] This reflects our evaluation of precedent spectrum transactions beginning with the ideal base case, then various conditions of impaired precedent cases, and in closing an observation of the willingness to surrender consideration for spectrum in the control stakeholder group's own spectrum acquisition

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Bankruptcy Court, 11-10612, Doc 675, filed 10/23/12, pp 122-128.

[4] We have given no value to the remaining assets of TerreStar Corporation, which includes an orbital slot, nor assumed any potential recovery to address fraudulent conveyance allegations in

history, including the 1.4 Spectrum, and other frequency bands.

- The implied residual equity value to TSC equity shareholders, accordingly, is in a range of $175 to $420 million or $1.25 to $3.05 per share[5]). This reflects the residual value to equity shareholders, after satisfying $515.5 million in claims accruing through the effective date of the bankruptcy. This range is illustrative of the substantial leverage equity shareholders have to differences in valuation above the creditor claims.

- Given the composition of TSC and its control group, as sophisticated financiers, spectrum investors, and industry experts, and likely well informed of the spectrum value friendly environment, it is hard to conclude these controlling stakeholders of the 1.4 Spectrum had reasonable confidence that a value maximizing transaction that provided recovery for equity shareholders did not have a reasonable possibility of occurring.

- The valuation presented by Steven Zelin ("the valuation expert") in support of the 1.4 Spectrum valuation, which was relied on by the court for confirmation of the plan, contained various misconceptions and inaccuracies that may have been supportive of the seemingly below market valuation. These include but are not limited to a tunnelled immediate-use limitation in the valuation of the 1.4 Spectrum, reliance on Book Value GAAP driven valuations, misinterpretation of value benchmarks derived from certain insider transactions, and submitting that a circa 20-day marketing process reflected a reasonable marketing period to assess fair market value.[6]

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the year or two prior to the filing of the bankruptcy.

[5] TSC has 140 million shares outstanding at the effective date

[6] Steven Zelin provides a declaration in support of confirmation of the plan, which states that

We understand that the bankruptcy of TSC involves very high stakes. The leverage minority shareholders have in implied residual ownership of TSC newco is very high. Our determination of TSC value per share range makes this apparent. As the 1.4 Spectrum value assesses beyond the $515.5 million in claims, the implied carried percent equity ownership interest in TSC newco to the equity shareholder, and by extension the ownership claim of the minority shareholders, increases rapidly vis-a-vis the controlling stakeholders' interest through the preferred shares. For illustration, consider a resolution were old equity claims participate with the preferred shareholders in the new company. If the license value is assumed to increase $0.01 per MHz-POP above the $515.5.8 million threshold of claims, old equity claims would be worth 5% of the TSC newco equity interest. That claim would rise to 25% of TSC newco equity at the bottom of our $0.28 per MHz-POP valuation and 45% at the top of our $0.38 per MHz-POP valuation range for the 1.4 Spectrum, that is 7% and 13%, respectively, for the ownership claim of the minority shareholders. From the perspective of a preferred shareholder, the equity share represents a potentially costly claim, if assessed at a 1.4 Spectrum value to far above $515.5 million.

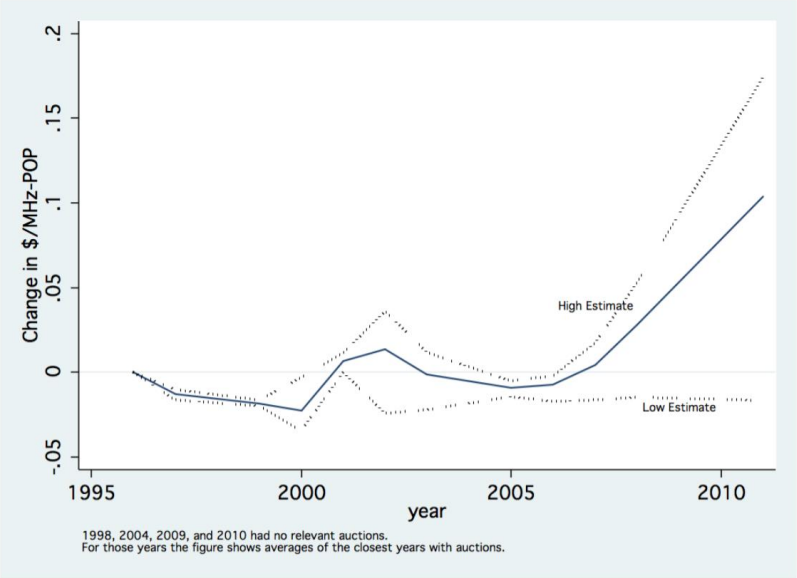
The following pages provide further elaboration on our conclusions. We address each in turn below.

TSC pursued alternative thransaction "to evaluate whether such transactions would provide a greater recovery to the TSC Debtors' stakeholders than that proposed by the plan", which plan appears could not have started before the last week of August, but more likely not until the second week or so of September, and running three or four weeks until the filing of this declaration on 10/5/12 in support of the confirmation hearing. TerreStar Corporation, et al., Debtors. *TSC Declaration of Steven Zelin in Support of Confirmation of theThird Amended Joint Chapter 11 Plan of TerreStar Corporation, et. al. Exhibit B of Debtors' Memorandum Of Law In*

II. SOUND VALUATION PRACTICE CONSIDERS MARKET EXPECTATIONS REGARDING FUTURE OPPORTUNITY, WHICH IN 2012/13 IS DRIVING SPECTRUM VALUES UP.

In 2012/13 spectrum value appears to be increasing. The chart below plots the year-over year-change in the mean value of transactions in only those spectrum licenses that allow broadband. It illustrates accelerating spectrum appreciation in the analysis period.[78] Our own compilation of spectrum transactions is in agreement.

Exhibit 2. Spectrum Prices Changes, Broadband Licenses Only



More telling is the activity of the major wireless carriers who are making large spectrum

Support of Confirmation. US Bankruptcy Court. 11-10612 Doc 650. Filed 10/05/12. pp. 60-61.

[7] Wallsten, Scott. "Is there really a spectrum crisis? Quantifying the factors affecting spectrum license value." (2013).

investments in auctions and secondary transactions.[9] They were not only making big commitments in general, they were making big bets on business models increasingly further out into the future.

The table below highlights transactions involving spectrum licenses generally considered of lower quality due to limitations on their use, or other encumbrance, that defers their ability to provide mobile broadband services further out into the future. We review these in Section III. These illustrate a willingness to commit very large amounts of capital to less than optimal spectrum during the analysis period.

Table 1: Highly Valued Spectrum Transactions in Encumbered and/or Non-Standard Concessions

[8] http://https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2206466

[9] The Council of Economic Advisers implies as much in stating, "The need to expand network capacity to accommodate growing demand for data services is the primary reason that wireless carriers were collectively willing to invest over $19 billion to purchase new spectrum during the FCC's 2008 auction of spectrum made available by the transition to digital over-the-air television broadcasting." (Council of Economic Advisers (U.S.). "The Economic Benefits Of New Spectrum For Wireless Broadband." [Washington, D.C.]: Executive Office of the President, Council of Economic Advisers, Feb. 2012. PP 5. https://permanent.access.gpo.gov/gpo19331/cea-spectrum-report-2-21-2012.pdf)

Deal	Date Announced	Encumbrance	Deal Size (Billions)
Sprint - Clearwire	Oct-12	Non-standard	$3.5
Dish - Terrestar and DBSB	2011	ATC status	1.8
Harbinger - Sky Terra	Mar-10	ATC status	1.6
AT&T - WCS	Aug-12	WCS rules	0.6
AT&T - Qualcom	Dec-10	Unpaired	1.9
Winners - FCC (Auction)[1]	Mar-08	Unpaired	1.3

[1] Auction 73 E-Block.

Notably, three of the transactions referenced above involve members of TSC's controlling stakeholders, either leading into the bankruptcy, and/or thereafter. In the transactions above they were willing to pay several multiples of the price per MHz-POP that they attributed to the 1.4 Spectrum, in some cases for severely encumbered spectrum.

This behavior and expression of increased appetite for all things spectrum can be explained by the environment of accelerating wireless demand against constrained supply, as well as the fundamental mathematics of financial valuation implicit in realized transaction prices.

A. An Inflection Point in Data Demand and Spectrum Scarcity Foretells A Spectrum Crunch:

> We're in the early stages of a mobile revolution that is sparking an explosion in wireless traffic. Without action, demand for spectrum will soon outstrip supply … Smartphones use twenty-four times the amount of data of traditional cell phones; other wireless devices, like tablets, can use more than 122 times the data. This explosion in demand for spectrum is putting strain on the limited supply available for mobile broadband, leading to a spectrum crunch. (Chairman Genachowski. FCC. The Clock is Ticking. Reboot. Posted March 16th, 2011. pp. 5. http://reboot.fcc.gov/blog?categoryId=840092

1. There Is Insatiable Demand.

Verizon's Executive Director of Network Strategy, William Stone, calls it "a 'hockey stick' shaped growth curve for network data traffic demand" in the company's FCC filing for approval of SpectrumCo's license transfers regarding the acquisition announced in December 2011. [10]

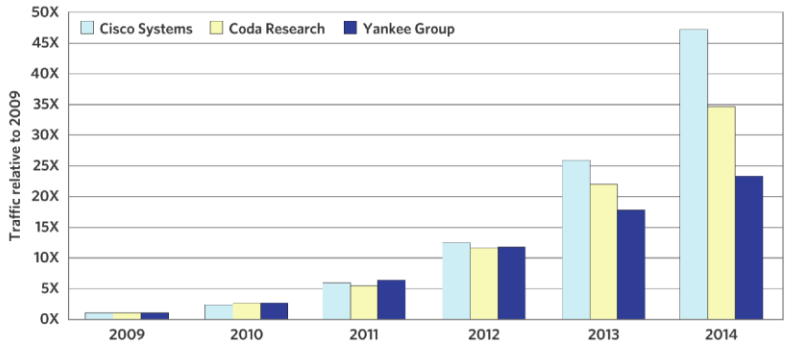
According to Cisco, in 2009, North American wireless networks carried approximately 17 petabytes per month, an amount of data equivalent to 1,700 Libraries of Congress. By 2014, Cisco projected wireless networks in North America would carry some 740 petabytes per month, a greater than 40-fold increase. Other industry analysts also forecast large proportional increases.[11]

Exhibit 3: Forecasted Mobile Data Traffic in North American[12]

[10] More specifically, William Stone states, "data traffic on our network has been nearly doubling every year and the pace of growth has been accelerating … a 'hockey stick' shaped growth curve for network data traffic demand, meaning that we are seeing not only increasing use but the pace of that growth is accelerating. (Declaration of William H. Stone, Executive Director of Network Strategy for Verizon. Attached as Exhibit 3 at 6, pp. 2-5.)

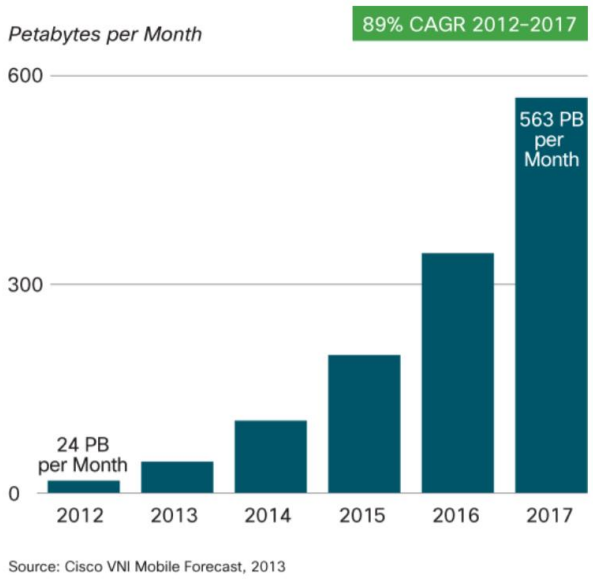
[11] United States. Federal Communications Commission.*Connecting America: The National Broadband Plan. [Washington, DC] : FCC,* Mar. 2010, PP. 76 https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf

[12] United States. Federal Communications Commission. Connecting America: The National Broadband Plan. [Washington, DC] : Federal Communications Commission, Mar. 2010, PP. 76 https://legacyexternalwebsitefiles.balch.com/upload/nationalbroadbandplan1.pdf



The Machine-to-Machine opportunity that the valuation expert for TSC cited in minimizing the 1.4 Spectrum at the confirmation hearing also seemed poised to deliver enormous growth. [13]

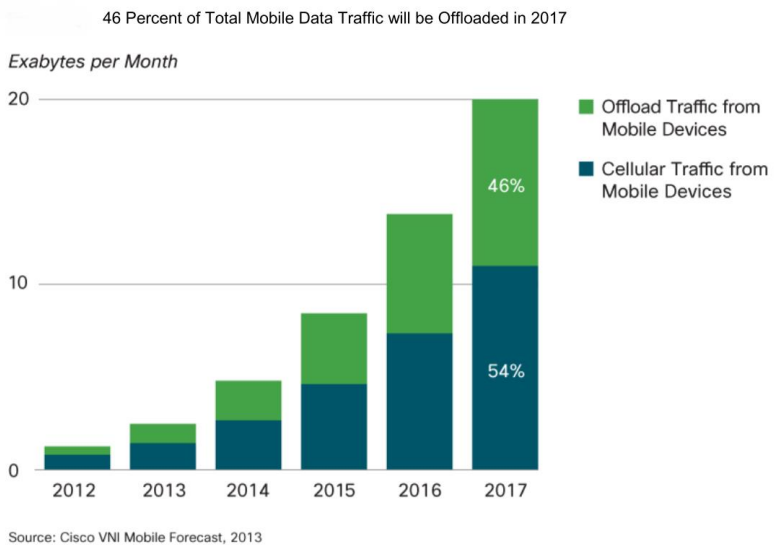
Exhibit 4: Forecasted Growth In Machine-To-Machine Traffic (2012-2017)



Likewise, poised to deliver enormous growth was the opportunity to off-load carrier

wireless network traffic with pico-cells to alleviate network capacity constraints,[14] which the following chart illustrates based on estimates from Cisco in 2013.

Exhibit 5: Projected Growth In Offloaded Traffic (2012-2017)



Furthermore, "An increase in mobile broadband use raises demand for other wireless

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[13] Cisco. VNI Mobile Forecast 2013.

[14] TSC minimized the enormous opportunity of pico-cell to offload traffic to support its low-value limited use model scenario. Note that the FCC cites that, as an alternative to spending an average of $550,000 on a cell site, "carriers often address network congestion by offloading data traffic from their wireless networks … and will undoubtedly play an increasingly important role in network capacity as wireless data usage increases."Council of Economic Advisers (U.S.). *The Economic Benefits Of New Spectrum For Wireless Broadband. [Washington, D.C.]: Executive Office of the President, Council of Economic Advisers,* Feb. 2012. PP. 6. https://permanent.access.gpo.gov/gpo19331/cea-spectrum-report-2-21-2012.pdf,

services … to enhance the overall delivery of broadband."[15]

The 1.4 Spectrum is poised to benefit from these trends.

2. There Is Little New Spectrum Supply On The Horizon In 2012/13.

Spectrum takes a long time to allocate. The chart below from the National Broadband Plan provides some perspective.

Exhibit 6: Time Required Historically To Reallocate Spectrum[16]

Band	First Step	Available for Use	Approximate Time Lag
Cellular (Advanced Mobile Phone System)	1970	1981	11 years
PCS	1989	1995	6 years
Educational Broadband Service (EBS)/Broadband Radio Service (BRS)	1996	2006	10 years
700 MHz	1996	2009	13 years
AWS-1	2000	2006	6 years

In 2009 FCC Commission Genachowski at CTIA restated the goals of the national broadband plan in his remarks that an additional 275 MHz of spectrum would be required to meet mobile data demand in 2014, and that 500 MHz should be made newly available for mobile, fixed, and unlicensed broadband use over the next 10 years, 300 of which for mobile

[15] United States. Federal Communications Commission. Connecting America: The National Broadband Plan. [Washington, DC]: Federal Communications Commission, Mar. 2010, PP. 77 https://legacyexternalwebsitefiles.balch.com/upload/nationalbroadbandplan1.pdf

[16] United States. Federal Communications Commission. *Connecting America: The National Broadband Plan. [Washington, DC]: Federal Communications Commission,* Mar. 2010, PP. 79 https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf

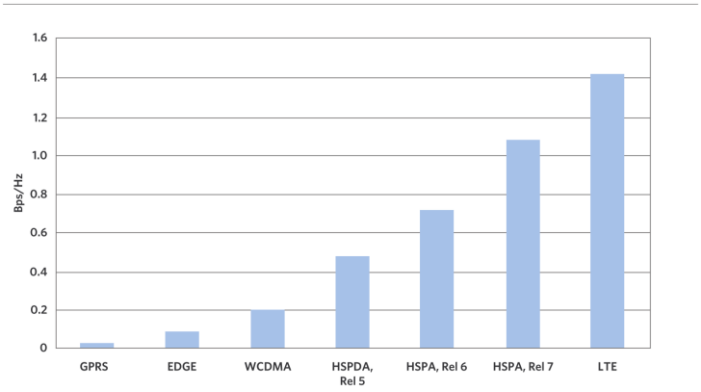
flexible use within five years. As of 2012/13, very little of this spectrum had been released to the market.[17]

The most recent auction prior to the bankruptcy was the winter of 2008 700 MHz auction. The next availability of new auction spectrum would wait until the 2014 H-Block auction, followed by the 2015 AWS-3 auction, and lastly the 2016/17 600 MHz Incentive Auction.

3. Spectral Efficiency is Rising But Cannot Keep Up With Surging Demand

Spectral efficiency[18] continues to improve but cannot keep pace with the rate of demand. The following chart depicts the progression of spectral efficiency over time.

Exhibit 7: The Evolution Of Spectral Efficiency



[17] Genachowski CTIA Remarks at 5.

[18] "spectral efficiency," is the amount of data that can be transmitted on a given band of the spectrum (measured in bits per second per Hertz of the spectrum). (Council of Economic Advisers (U.S.). The Economic Benefits Of New Spectrum For Wireless Broadband. [Washington, D.C.]: Executive Office of the President, Council of Economic Advisers, Feb. 2012. PP. 6. https://permanent.access.gpo.gov/gpo19331/cea-spectrum-report-2-21-2012.pdf)

"Spectral efficiency has increased by a factor of roughly 40 or more since the early days of second-generation (2G) wireless[19] The following table provides perspective on expected roll-outs of new broadband technology, including LTE and Wimax as of 2010, that promise further improvement in spectral efficiency, albeit at a much lower rate than demand.[20]

Exhibit 8: Announced Mobile Broadband Network Upgrades[21]

Technology	Companies	2009	2010	2011	By 2013
LTE	Verizon AT&T MetroPCS Cox		Verizon (100 million) AT&T (trials)	AT&T (start of deployment) Cox (start of deployment) MetroPCS (start of deployment)	Verizon (entire network)
WiMAX	Clearwire/Sprint OpenRange Small wireless Internet service providers (WISPs)	Clearwire (30 million) WISPs (2 million)	Clearwire (120 million)		OpenRange (6 million)

"However, the network capacity improvements from the migration to 4G technologies are not expected to keep pace with the surging demand for wireless data services."[22] [23]

[19] United States. Federal Communications Commission. *Connecting America: The National Broadband Plan. [Washington, DC]: Federal Communications Commission,* Mar. 2010, PP. 77 https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf

[20] Id.

[21] Id at pp. 77

[22] Id.

[23] The FCC projected average spectral efficiency of wireless would double between 2009 and 2014, which assumed a gradually improving spectral efficiency as 4G networks were rolled out. Council of Economic Advisers (U.S.). *The Economic Benefits Of New Spectrum For Wireless Broadband.* [Washington, D.C.]: Executive Office of the President, Council of Economic Advisers, Feb. 2012. PP. 6. https://permanent.access.gpo.gov/gpo19331/cea-spectrum-report-2-21-2012.pdf

4. Network Investment Alternatives Are Expensive And Have Diminishing Returns.

Carriers can also expand wireless network capacity by increasing "spatial reuse" of the spectrum, that is, they can place towers and antennas closer together so the same band of spectrum can be used more intensely. However, this option requires substantial financial investment.[24] There are also diminishing returns to this investment, as Verizon explains in its application requesting approval of the transfer of licenses from SpectrumCo.[25]

B. The Present Value Rule Explains Why Markets Discount Future Opportunities Into The Current Price.

1. The Forward Model Is A Material Component Of The Present Value Of An Asset Or Business.

The formula below illustrates the present value rule, that is the fundamental premise that underlies any valuation, even if it is not usually practical to employ in the field.[26]

[27]

Exhibit 9: The Present Value Rule

[24] The FCC estimated that this kind of investment would cost wireless carriers $170 billion to satisfy demand in the absence of new spectrum. Such expansion would have been unprecedented and likely face steep obstacles. (Id.)

[25] "As more sites are placed close together, the benefits of additional sites decline, particularly relative to the zoning, equipment, construction, and other expenses necessary to deploy more sites … In short, techniques to enhance the efficient use of the spectrum the company currently holds cannot alone meet the accelerating demand for more network capacity." (Declaration of William Stone Declaration of William H. Stone, Executive Director of Network Strategy for Verizon. Para. 14, pp. 8.)

[26] Damodaran, Aswath. *Investment valuation: Second Edition*. John Wiley & Sons, 2005.Ch. 2, pp. 1.

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

where,

n = Life of the asset

CF_t = Cashflow in period t

r = Discount rate reflecting the riskiness of the estimated cashflows

As the formula illustrates, the value of the asset is equal to the cash flow received each period, over the life of the asset, discounted to the present at a rate that reflects the riskiness of the asset or business.

In the context of the present value rule, the escalation of spectrum value as the mobile opportunity expands, technology advances, and as regulators become more willing to re-purpose spectrum to high value uses, can be intuited by the present value rule. Rising expectations for wireless demand, and increasing likelihood of scenarios that put spectrum to high value uses, discounts to higher present values that should apply across mobile broadband spectrum bands.

These principals do not appear lost on the major wireless carriers in the period surrounding the bankruptcy. Their investments in spectrum reflected a substantial component of future expectations in the present value.[28]

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[27] http://file:///C:/Users/iarte/OneDrive/Downloads/investment_valuation-damodaran.pdf

[28] Verizon provides good insight in this regard. In its Public Interest Filing, and in the Declaration of its Executive Director of Network Strategy, William Stone, in their application for approval to transfer AWS licenses from the SpectrumCo acquisition. It elaborates on the long horizon involved in spectrum acquisition because of the years of work required to get it into the market (a time horizon he brackets as 1 to 7 years). In summary, spectrum deployment requires: (a) RF design, (b) network infrastructure vendor collaboration, (c) other equipment manufacturer (OEM) collaboration, (d) zoning work, (e) site equipment deployment, (f) establishing back-haul to the Verizon network, (g) testing and fine-tuning." Stone, William. *Declaration of William H. Stone, Executive Director of Network Strategy for Verizon. at 14, pp. 8.*

2. Given A Forward Model, The Value Destruction Of Encumbrances On Current Realizable Value Should Be Somewhat Dampened.

The two-step version of the present value rule better illustrates the future component of present value by emphasizing the significance of the terminal value component.

Exhibit 10: The Two-Step Version Of The Present Value Rule

$$\text{Value of a Firm} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+k_c)^t} + \frac{\text{Terminal Value}_n}{(1+k_c)^n}$$

The terminal value generally represents the bulk of an investment return.[29] The present value model can also be useful to gain a better understanding of the impact of encumbrances and limitations on the use of spectrum licenses. It can also help explain differing value realization in a spectrum that has different characteristics. These could include, frequency band, spectrum configuration, the limit on use, or various other encumbrances. These factors

[29] "When you buy a stock or invest in a business … the bulk of the return come not while you hold the equity (from dividends or other cash flow) but when you sell it (from price appreciation). The terminal value is designed to capture the latter. Consequently, the greater the growth potential of a business, the higher the proportion of the value that comes from the terminal value will be." (Damodaran, Aswath. *Investment valuation: Second Edition*. John Wiley & Sons, 2005. Ch. 12, pp. 24.

affect cash flow, its timing, the likelihood of potential scenarios, and/or the respective risk.

In a similar fashion, in considering the value impact of a limited use scenario that affects the present, such impact is limited to its weight vis-a-vis all of the other scenarios that exist across the life of the assets available use, discounted to the present. This is particularly applicable in considering the valuation expert's reliance on RKF's assessment of current use limitations and exclusions. This is especially so in light of emerging technology that would reduce these in the near future.

It is illustrative in this regard that the valuation expert acknowledges that carrier aggregation, of the LTE Advanced standard, will enable carriers to utilize the 1.4 Spectrum for macro-cell extension, but he qualifies this by stating: "I would note that LTE Advanced is not expected to be deployed in the United States until 2014 and 2015." This new technology that promises to make 1.4 Spectrum fully available for high-value mobile broadband use, is only a year or two away.[30] Its instructive that on December 20, 2010, AT&T announced an agreement to acquire a national block 700 D-band, with certain E-band spectrum markets, for $1.925 billion or $0.82 per MHz-POP. That gave it a nationwide 700 MHz D-Block with 6 major markets of 700 MHz E-Block.[31][32]

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http://file:///C:/Users/iarte/OneDrive/Downloads/investment_valuation-damodaran.pdf)

[30] See the valuation expert's declaration: (TerreStar Corporation, et al. Debtors. *The TerreStar Corporation Declaration Of Steven Zelin In Support Of Confirmation Of The Third Amended Joint Chapter 11 Plan Of TerreStar Corporation, et. al.* Exhibit B of Debtor Memorandum of law in support of confirmation … [New York] United States Bankruptcy Court, 11-10612, Doc 650, filed 10/05/12, at 16, pp 8 (also see footnote 4).

[31] Qualcomm, AT&T Agrees to Aquire Wireless Spectrum from Qualcomm(press release), Dec. 20, 2010,

[32] http://https://www.qualcomm.com/news/releases/2010/12/20/att-agrees-acquire-wireless-

[33] This transaction not only validates that AT&T believed enough in the future of carrier aggregation technology to pay billions for this unpaired spectrum, it was also willing to wait a long time, for the technology, the network, and the handsets, to ultimately deploy the spectrum in the market and start realizing its value.

3. The Behavior Of The Controlling Stakeholders Validates These Principals.

Our review of spectrum transactions suggests that this principal was not lost with the members of the TSC control group who were renown as spectrum investors and savvy financiers. Repeatedly we see evidence of forward-looking investment or commitments, which include: (1) the Highland Capital Management, L.P. ("Highland") / Solus Alternative Asset Management, L.P. ("Solus")control investment in CCTV that won half of the national footprint of 1.4 Spectrum, (2) Harbinger Capital Partners ("Harbinger") Sky-Terra roll-up,[34] (3) Dish Network Corporation's ("DISH") consolidation of 2.0 Spectrum in the bankruptcy proceedings of DBSB

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spectrum-qualcomm

[33] In its license transfer filing with the FCC, AT&T articulated in detail its plans to put this unpaired spectrum to high-value mobile broadband use. It stated, "AT&T will employ an innovative new technology called supplemental downlink to integrate this spectrum into its LTE network. Unlike The spectrum in most of the other bands in which wireless data services are currently offering, the lower 700 MHz D and E block spectrum is not paired. Supplemental downlink will make it possible to bond the unpaired Qualcomm spectrum with the paired spectrum AT&T uses in its LTE network … by enabling AT&T to repurpose Qualcomm's underutilized Lower 700 MHz D and E block spectrum for cutting-edge, two-way broadband services most demanded by customers … the new LTE advanced standard and supplemental downlink technology soon will allow carriers to bond additional unpaired spectrum to existing spectrum holdings to provide improved downlink capacity in response to increased customer demand. (AT&T, "Declaration Of Kristin S. Rinne, Senior Vice President – Architecture & Planning, At&T Services, Inc.". Application. FCC Form 603. Jan. 2011. http://https://ecfsapi.fcc.gov/file/7021027712.pdf)

[34] See comments of Furchtgott-Roth, Commissioner of the FCC (1997-2001) that "the L band spectrum does not appear to be easily developed for mobile broadband purposes.Furchtgott-Roth H, Sosa D, Stone E. An Assessment of the Economic and Industry Reasonableness of Sprint's Offer for Clearwire. Mar. 2013, http://www.analysisgroup.com/insights/publishing/an-assessment-of-the-economic-and-industry-reasonableness-of-sprint-s-offer-for-clearwire/

and TerreStar Networks ("TSN"),[35]

In the case of the 1.4 Spectrum, beginning in the fall of 2013, we see the control group as new owners of the TSN newco, engaged with Jarvinian and the FCC in their attempts to put the 1.4 Spectrum to high-value mobile broadband uses.[36]

We will review the specifics of several of these transactions as we get into more depth, when we review comparable precedent transactions of conventional, encumbered, as well as the history of 1.4 Spectrum transaction benchmarks.

C. Conclusion

In ascribing a valuation of $160 to $235 million, the valuation expert relied on a limited use model for the 1.4 Spectrum that minimized the weight of future opportunities. Some of these opportunities were only one or two years away.[37] The court's oral opinion at the confirmation

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[35] See comment that "the S-Band Spectrum has been approved for mobile broadband purposes[subsequent to the transaction, as of 12/1/12], but actual deployment may still be several years away. (Id.)

[36] Jarvinian. *Securing the value and the negotiability of the TerreStar 1400 Asset. TerreStar Board Presentation, Sep. 2013. U.S. Bankruptcy Court, 10-15446, Doc 1158-1, filed 01/09/14; Also see the Ex-Parte presentation to the FCC. (*Jarvinian. "An Integrated Spectrum Solution For L-Band (Presentation to the Federal Communications (FCC)" Mar. 14. http://https://www.fcc.gov/ecfs/filing/6017609284)

[37] See the valuation expert's declaration. (TerreStar Corporation, et al. Debtors. *The TerreStar Corporation Declaration Of Steven Zelin In Support Of Confirmation Of The Third Amended Joint Chapter 11 Plan Of TerreStar Corporation, et. al.* Exhibt B of Debtor Memorandum of law in support of confirmation … [New York] United States Bankruptcy Court, 11-10612, Doc 650, filed 10/05/12, pp 59.

hearing makes clear it relied heavily on this testimony.[38] As we can see from the points made above, such reliance would likely result in a severely undervaluation of the 1.4 Spectrum.

[38] See court's oral opinion in the transcript of the confirmation hearing: (TerreStar Corporation, et al. Debtors. Hearing re: Doc. #513 Confirmation Hearing. [New York] United States Bankruptcy Court, 11-10612, Doc 675, filed 10/23/12, pp 122-128.

III. Interpolating a Valuation of $0.28 to $0.38 per MHz-POP

1. The Scope Of Valuation.

For the purpose of performing this valuation, we define value as that range of outcomes that provides a reasonable level of confidence regarding where a transaction would be expected to occur. This assumes a reasonable and genuine attempt to market the asset. In that regard, it is not a liquidation valuation. We do not assume worse case marketing conditions, rather a value-maximizing approach, assuming reasonable marketing conditions over a reasonable marketing period.[39] We utilize a relative value approach that evaluates comparable precedent transactions and allows us to bracket an appropriate range of estimated value-maximizing values. To begin,

[39] While the valuation expert cites their marketing process as a reliable basis for supporting their estimate of valuation of the 1.4 Spectrum in a range of $160 to $235 million or $0.06 to $0.09 per MHz-POP, their Memorandum of Law in Support of the Confirmation indicates it was prepared for liquidation value, for the Best Interest Test, not a value-maximizing transaction. The purpose of such Best Interest Test is to demonstrate that equity holders would receive less value in a liquidation, than under the plan. Per TSC's disclosure it is notable that roughly two-years since TSN filed on 10/13/10, and TSC filed 2/17/11, the marketing of the 1.4 Spectrum is only beginning in September 2012, i.e. after the Disclosure Statement Order 8/24/12, the 'Notice Of Marketing' filed on 8/31/12, the publishing of this notice in national publications on 9/5 and 9/6 of 2012. No more than roughly 20 business days or so were apparently provided for marketing before concluding in their Memorandum Of Law In Support Of The Confirmation Plan on 10/05/12, that their efforts for a successful marketing had failed. Note that such marketing process, in order to be reasonably effective, would have required proper outreach to appropriate decision makers to be adequate, i.e., regarding the twenty-eight (28) or so parties they solicited for interest to explore "alternative transactions regarding a potential sale of all or substantially all of the TSC Debtors' assets (or any other value-maximizing transaction), primarily the 1.4 Spectrum, to evaluate whether such transactions would provide a greater recovery to the TSC Debtors' stakeholders than that proposed by the plan" (TerreStar Corporation, et al., Debtors. TSC Declaration of Steven Zelin in Support of Confirmation of the Third Amended Joint Chapter 11 Plan of TerreStar Corporation, et. al. United States Bankruptcy Court. 11-10612 Doc 650. Filed 10/05/12. at ¶23-32, pp. 10-14.

we need to identify the appropriate universe. We address the issue of the universe in the following section.

2. Mobile Broadband Spectrum Is The Universe Of Comparison.

(a) The FCC has designated the 1.4 Spectrum as flexible use spectrum available for mobile broadband use.

As the valuation expert describes in his declaration [40] "the FCC has adopted a 'flexible use' standard for the 1.4 Spectrum that allows it to be used for fixed and/or mobile (except aeronautical mobile) services, including wireless Internet, high-speed data transfer services and advanced two-way mobile and paging services".[41]

The table below presents the scope of the license band universe designated (or intending) mobile broadband use.

[40] Id. Exhibit B Zelin Declaration at ¶11-12

[41] The valuation expert rebuts the FCC' use designation by listing as drawbacks a number of characteristics that are normal course discussion in putting broadband spectrum to use including, power and interference consideration, sharing and/or relocation of incumbent users, and interestingly the ordinary need to demonstrate "substantial service" 10 years after a license is

Table 11. Mobile Broadband Service Bands

Part (CFR)[1]	Purpose	Permitted Uses	Radio Services Bands[2]
Part 27	Miscellaneous Wireless Commications (WCS)	Flexible Use (mobile broadband permissable)[3]	700 MHz, WCS, 1.4 GHz, 1.6 GHz, AWS-1, AWS-2 (H-Block), BRS, EBS, AWS-4 (MSS), AWS-3, 600 MHz
Part 24	Personal Communications Services (PCS)	Any mobile communications service; fixed service (co-primary); broadcasting prohibited.	PCS Blocks A-G[4, 5]
Part 22	Public Mobile Service (Cellular)	Any mobile communications service; fixed service (co-primary); broadcasting prohibited.	Cellular Service (800 MHz) Band[5]
Part 25	Satellite Communications	Any mobile communications service; fixed service (co-primary); broadcasting prohibited.	L-Band, MSS

Notes:

(1) Code of Federal Regulations Title 47 rules and regulations for telecommunications.

(2) H-Block, AWS-3, and Incentive Auction took place after 2014.

(3) Except that: (a) operators in 775-776 and 805-806 (upper 700 B Block Guard Band) cannot employ a cellular system architecture; (b) operators in the 716-722 MHz and 722-728 MHz bands (the lower 700 unpaired D and E Blocks owned by AT&T and Echostar) may not use them for uplink transmission because they are restricted to downlink transmissions. .

(4) The G-Block (1910-1915 and 1990-1995) was issued to Nextel in a spectrum swap proceeding.

(5) A handful of bands were allocated for paging services and aeronautic, which we exlude.

Source: FCC Spectrum Dashboard (last updated 07/07/14), which captures relevent period.

These include 'flexible use' licenses (Part 27), PCS-personal communications licenses (Part 24), and cellular service licenses (Part 22). The table also includes satellite bands (Part 25) that have disclosed intentions to re-purpose the bands for full mobile broadband services as of the analysis period. We excluded licenses limited to aeronautical communications and narrow-band applications that are not suitable for land-based mobile broadband services.

(b) The 1.4 Spectrum has sufficient bandwidth for inclusion in the mobile broadband universe.

Note that Motorola advertises in 2010 that the benefit of LTE technology is the ability to

awarded, which was April of 2017 in the case of the 1.4 Spectrum. (Id.)

deploy it in channels as small as 1.25MHz, which provides "scalability as it can be literally 'squeezed' in … to maximize the use of whatever spectrum becomes available."[42] [43] DISH, who was a member of the TSC controlling stakeholder group, at least at TSC's entry into the bankruptcy, confirmed its commitment to this upcoming LTE-Advanced standard in a presentation and subsequent Ex-Parte filing to the FCC February 2, 2012, regarding its intended 2.0 GHz acquisitions, stating that:

> AT&T, Verizon, and Sprint have themselves recently announced plans to move to LTE Advanced. There are good reasons for this fundamental shift. The differences between LTE Advanced and prior versions of LTE are so significant that the ability to provide LTE Advanced service and devices to one's customers will be critical to offering competitive mobile broadband services that can keep pace with American consumers' rapidly increasing demands for data. (FCC, ET. "Letter to Marlen H. Dorch RE: IB Docket No. 11-149, New DBSD Satellite Service G.P., Debtor-in-Possession, and TerreStar Licensee Inc., Debtor-in-Possession, Request for Rule Waivers and Modified Ancillary Terrestrial Component Authority; IB Docket No. 11-150, DISH Network Corporation Files to Acquire Control of Licenses and Authorizations Held by New DBSD Satellite Services G.P., Debtor-in-Possession and TerreStar License Inc., Debtor-in-Possession" Request for Comments on a Request for a Waiver of Part 15. Feb. 2012. http://https://ecfsapi.fcc.gov/file/7021858214.pdf)

(c) Power restrictions merit evaluation, not exclusion, from the mobile broadband universe.

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[42] Motorola, Inc. "Spectrum Analysis for Future LTE Deployments." *White Paper,* downloaded December 10, 2017 from http://www.motorola.com/staticfiles/Business/Solutions/Industry%20Solutions/Service%20Providers/Wireless%20Operators/LTE/_Document/Static%20Files/LTE_Spectrum_Analysis_White_Paper_New.pdf

[43] In support of the bankruptcy confirmation, the TSC valuation expert minimized the value of the 1.4 Spectrum, stating, that an "unfavorable spectrum configuration of the 1.4 Spectrum renders it less favorable for use with 4G technologies and high-bandwidth applications, which benefit from larger spectrum blocks (i.e. 5 MHz or more),"(TerreStar Corporation, et al., Debtors. TSC Declaration of Steven Zelin in Support of Confirmation of the Third Amended Joint Chapter 11 Plan of TerreStar Corporation, et. al. United States Bankruptcy Court. Exhibit B, 11-10612 Doc 650. Filed 10/05/12, at ¶11-12.)

DISH provides a good point of reference. In its interim construction notification filing last year, DISH discusses the challenges imposed by power and emission limitations imposed by the FCC that apply to its E-Block and AWS-4 (2.0 Spectrum). In DISH's case, these restrictions were likely well anticipated when they acquired the spectrum, which we estimated was at $0.55 per MHz-POP for its E-Block (6 MHz unpaired) acquisition in auction 73 and $0.23 per MHz-POP for its AWS-4 spectrum in bankruptcy.[44] Also consider the 2.5 GHz WCS licenses AT&T acquired from Nextwave for $0.25 per MHz-POP in January of 2014. This acquisition took place while the WCS licenses still maintained power and emissions limitations severe enough to prevent them from providing mobile broadband.[45]

(d) The behavior of TSC's own control group implies they believe the 1.4 Spectrum is intended for mobile broadband use.

TSC's own control group, as owners of TSC newco, only six months after emerging from bankruptcy are engaged with spectrum consultant Jarvinian, regarding spectrum repurposing

[44] Dish Network Corporation. DBSD Services Limited, Gamma Acquisition L.L.C., and Manifest Wireless L.L.C.'s Consolidated Interim Construction Notification for AWS-4 and Lower 700 MHz E Block Licenses March 7, 2017. FCC. Filed 3/7/17. pp. 13-14, 19. https://wireless2.fcc.gov/UlsEntry/attachments/attachmentViewRD.jsp;ATTACHMENTS=lQrJY1mNcncxwSLGDkYZy2m1zsrQgL0G62cp3zQyGt8TK2Qjcdnw!1126769176!453907773?applType=search&fileKey=1957567040&attachmentKey=20103055&attachmentInd=applAttach; Also see generally FCC, Summary for Auction 73 (700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73 last visited Jan. 26, 2018)

[45] See *AT&T Agrees to Acquire NextWave Wireless, Inc. Dallas, Texas, August 02, 2012.* Press Release.

opportunities that extract the highest value use of mobile broadband spectrum.[46] [47] Highland, in its 2016 and 2017 annual reports to shareholders of the fund that holds the TerreStar investment, describes the enormity of the mobile broadband opportunity of the TSC spectrum,[48] [49] [50]

3. Our approach.

Our objective is not to identify an identical match, which is a difficult approach to rely on in spectrum markets, because of the variety in characteristics of spectrum licenses. Instead we attempt an examination that allows an interpolation of a range of value for the 1.4 Spectrum, so that we can 'bootstrap' the value of the 1.4 Spectrum, by looking at a whole range of transactions and understanding the various nuances that come into the valuation process for each. By looking at the factors in transactions involving bands above, as well as below the holistic 1.4 Spectrum quality characteristics, a pattern emerges that provides reliable confidence support for a range were a value-maximizing transaction of the 1.4 Spectrum can reasonably be expected to take

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[46] Jarvinian. TerreStar 1400 MHz Spectrum. "Securing the Value and Negotiability of the TerreStar 1400 Asset." Exhibit A. 10-15446-shl. Doc 1158. Filed 01/09/14. Pages 28-49 http://www.TerreStarinfo.com/pdflib/1158_15446.pdf

[47] Jarvinian. "An Integrated Spectrum Solution For L-Band (Presentation to the Federal Communications (FCC)" Mar. 14. http://https://www.fcc.gov/ecfs/filing/6017609284

[48] Highland Funds II. "Annual Report For The Year Ended September 30, 2017". Form N-CSR. Filed 1/4/18. pp. 3. http://https://www.sec.gov/Archives/edgar/data/891079/000119312517362402/d460021dncsr.htm

[49] Highland Funds II. "Annual Report For The Year Ended September 30, 2016". Form N-CSR. Filed 1/4/18. pp. 3. http://https://www.sec.gov/Archives/edgar/data/891079/000119312516780629/d287379dncsr.htm

[50] Ironically, the comments in 2017, were reported after the FCC on October 10, 2017, denied TerreStar's waiver to extend the deadline to meet the "substantial" service obligation, and canceled their license effective April 2017. (FCC 17-995. *TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements for 1.4 GHz Licenses.* WT Docket No. 16-290, ORDER adopted: October 10, 2017, released: October 10, 2017(FCC denies TerreStar request for temporary waiver of substantial service requirements for 1.4 licenses))

place.[51]

With regard to the selection of transactions we explore, it is important to keep in mind that: (a) we are comparing to nationwide mobile broadband spectrum because the 1.4 Spectrum is a national license, (b) large deals will provide higher confidence than small deals, (c) we present only 'measurable'[52] transactions in the discussion below, (d) we look for and can get directional meaning from transactions that do not disclose measurable data, by mining the record of their disclosures and making our own estimates to allocate values appropriately. Accordingly, while we can only present a small subset of transactions in this report, those that have been selected on the basis of being most illustrative of fair value, we have considered dozens of transactions, specifically within the mobile broadband scope of wireless license transaction, where we could gather sufficient information to extract meaning.

In the rest of this section, we proceed with, and assemble, the raw material for this interpolation. First, we analyze transactions of conventional spectrum, to get a baseline for market level and to assess the rate of appreciation of the market. Then we examine unconventional and impaired bands to establish patterns and relative differentials in market pricing of these respective factors. Next, we review and correct certain misconceptions of value

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[51] See statements of former Commissioner Furchtgott-Roth (1997-2001) that provide a good defense and reasoning for this approach, which he states as follows: "A better approach would be to present the value of spectrum transactions in various bands and then describe the various factors that might be considered in comparing values of different portfolios of spectrum licenses in different bands." (Furchtgott-Roth H, Sosa D, Stone E. An Assessment of the Economic and Industry Reasonableness of Sprint's Offer for Clearwire. Mar. 2013, http://www.analysisgroup.com/insights/publishing/an-assessment-of-the-economic-and-industry-reasonableness-of-sprint-s-offer-for-clearwire/

[52] In this sense we mean there is disclosure regarding price and clarity regarding the subject

benchmarks that pertain to the history of 1.4 Spectrum transactions. Finally, we close with our conclusions for the 1.4 Spectrum value and by extension the value per share of TSC.

A. Establishing A Baseline (Unencumbered Nationwide AWS Spectrum).

The starting point is the baseline value of a conventional unimpaired national spectrum license. We use the AWS-1 band as the standard baseline, against which we attempt to normalize the precedent transactions we encounter across the universe of sub-3 GHz frequency bands identified previously for mobile broadband use. When relevant, we make the adjustments to reflect different value factors the market seems to reflect based on the location of the radio-frequency spectrum. These value differences should reflect some of the differences in propagation characteristics between bands, and the respective economic impact. We also make adjustments to transaction benchmark data to extrapolate an implied value for the national band license. This is usually more relevant to smaller-scale acquisitions.[53] The universe of precedents presented herein includes primarily 700 Spectrum and AWS Spectrum. The bulk of activity in other bands, i.e. Cellular and PCS is either outside the analysis period, lacks information on terms, or involves commingling of various bands or operating assets in the transaction. Nevertheless, this universe of transactions provides a sufficiently complete picture of relevant valuation precedents for the conventional spectrum ideal. It is also a good point of comparison for assessing the reasonableness of discounts for perceived quality differentials against this ideal.

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spectrum to which that price applies.

[53] We estimate implied national license values, by grossing up small footprint transaction, based on the value weight of the region under consideration vis-a-vis the total proceeds in the original

We begin with 700 Spectrum precedents, then continue with the AWS precedents.

1. The 700 Spectrum Precedents

700 Spectrum benefits from being a lower frequency band than the AWS band, and benefits from the better propagation characteristics that are found at lower frequencies (700 Spectrum, cellular, and 600 MHz). Better propagation facilitates wider coverage per cell and better in-building penetration. These differences have real cost implications because of the lower network densities they can support. Thus there is economic justification for higher value for lower frequencies relative to higher frequencies. [54] We generally assume a factor of 1.3 to 1 reflects the markets willingness to pay more for 700 Spectrum compared to AWS. This seems to reflect some but not all of the propagation advantage promised by the difference in band location. Note that this advantage seems to have lessened over time. [55] [56]

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auction.

[54] For the benefit of reference, these relative advantages of the location of a frequency band in the radio spectrum also apply to the 1.4 Spectrum Frequency Band, which is located above the 700 Spectrum and below the AWS band.

[55] In 2011, Cole Bazelon of the Brattles Group prepared a study sponsored by the wireless coalition in which he analyzed the expected proceeds of the various prospective spectrum auctions to the U.S. Treasury. He observed that recent transaction, and the Spec Ex Spectrum Index that existed at the time, valued the 700 MHz at a factor of roughly 1.3 times the value of AWS spectrum, which is located at 1.9 or 2.1 MHz.(Coleman Bazelon, Expected Receipts from Proposed Spectrum Auction (The Brattle Group, Inc., July 28, 2011); Coleman Bazelon, "Oral Testimony of Coleman Bazelon, The Brattle Group, Inc." (Testimony, U.S. House of Representatives, Committee on Energy and Commerce, Subcommittee on Communication and Technology, April 12, 2011), http://democrats.energycommerce.house.gov/sites/default/files/image_uploads/Testimony_04.12.11_Bazelon.pdf.)

[56] According to the former commissioner Furchtgott-Roth, many networks, especially in urban areas, are designed for density. Accordingly, in these networks, the density might be the same at 700 MHz, 1.9 or 2.1 GHz. He goes on to explain how except in the case of a new entrant build-out, or where the goal of the network configuration is to minimize the number of cells to cover a

The table below includes the relevant 700 Spectrum precedents.[57] These frequencies have been leaked into the market in a series of auctions over six years beginning with auction 44 in on 08/2002, until auction 73 in February through March of 2008.

Table 2: The 700 MHz Band (paired[1]) Precedent Transactions

Deal	Band	Date Announced	Deal Size (Billions)	$ / MHz-POP
Winners - FCC[1, 2]	Lower C	2002-2003	$0.1	$0.04
AT&T - Aloha	C	Oct-07	2.5	1.06
Winners - FCC[1, 3]	A, B, E, Upper C	Mar-08	17.9	1.00
Leap - Verizon[4]	A	Dec-11	0.2	1.58

[1] Excludes the unpaired lower D and E-Block and narrowband guard bands sold. The public-safety upper D-Block never sold.

[2] Includes auction 44 and 49 re-auction, but not the 69 auction of 5 licenses worth less than $1 million two years later in 2005.

[3] Includes auction 73 but not auction 92 (re-auction of 16 low value licenses that raised $20.4 mil.), held more than 3 years later.

[4] Chicago market A-Block license.

[4] Has been normalized to the AWS baseline at a factor of 1.3 and after smoothing the impact of an open acces requirement.

We review these transactions in turn below.

(a) Auction 44: The Lower 700 MHz Auction.

This auction took place more than 10 years before the analysis period and so is not relevant. It does illustrate how even highly regarded frequencies can sell at low prices if the

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geographic area, there is probably only a slight benefit in value for lower band spectrum versus higher mobile broadband. (Harold Furchtgott-Roth. A Review of "Value and Utility of the U.S. 2.5 GHz Spectrum Band" April 2013. pp.5.)

[57] The original auctions (2002/03) are presented only for perspective since it is 10 years stale by

market conditions are not supportive, in this case, very limited participation, lack a presence by the major carriers, and an environment of recession and capacity glut in the telecommunications industry. [58]

(b) AT&T - Aloha.

This transaction presents a good-arms length transaction involving a reasonably large geography. Here AT&T acquired Aloha Partners 700 Spectrum C-block for $2.6 billion or $1.06 per MHz-POP. The transaction was announced on or around October 9, 2007. Due to size, it provides a reasonable approximation of a national license as is, without adjustment. It is a strategic acquisition for AT&T because it gives them a foothold in the 700 Spectrum band with a large chunk of the lower 700 C-block spectrum. It includes spectrum Aloha previously acquired from Cavalier and Datacom. With the successful acquisition of much of the 700 Spectrum B-block in auction 73, a few months later in February 2008, they are well established in the 700 Spectrum band.[59]

(c) Auction 73: 700 Spectrum auction.

Auction 73 took place between 1/24/08 and 3/18/08 and realized $18 billion for the U.S. Treasury or $0.92 per MHz-POP.[60] The auction had active participation, including all the large

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the analysis period.

[58] (See generally FCC, Summary for Auction 44 and 49 (Lower 700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=44 last visited Jan. 26, 2018)

[59] See press release, *AT&T Acquires Wireless Spectrum from Aloha Partners.* October 9, 2007 https://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=24516

[60] (See generally FCC, Summary for Auction 73 (700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73 last visited Jan. 26, 2018)

national carriers except T-Mobile. The auction offered three bands of paired spectrum, one band of unpaired spectrum, and another band with a public safety obligation that did not receive the minimum bid requirement. Notwithstanding the apparent success, the D-block did not sell, and the C-block, with its open access requirement, seemed to sell for billions below potential. For perspective, the A band sold for $1.16 per MHz-POP, the B-band for $2.67 per MHz-POP and the C block for $0.76 per MHz-POP, about equivalent to the value of the unpaired E-block that sold for $0.74 per MHz-POP. This implies many billions of potential lost revenue. Note that auction 73 was a large auction with roughly 21.1 billion MHz-POPS up for auction. Notwithstanding, only 6.8 billion of those MHz-POPS represented the most highly sought paired licenses with no open access or public safety requirement. Accordingly, it seems there was some concentration of demand in those licenses that could overcome supply factors that seemed more prevalent in the also large 2006 auction of AWS-1 licenses. We surmise that absent an open access requirement, some of the demand in the B-block that AT&T was motivated to win, would have been alleviated. Therefore, the distortion in values per MHz-POP in the A and C, compared to the average, very likely would have reverted to the mean. We estimate that would imply roughly $1.45 of per MHz-POP value for the A and the C without an open access requirement. We would suggest this implies an auction value around $1.30 per MHz-POP for the paired 12 MHz band of 700 Spectrum. If we apply a factor of 1.3 for frequency band location adjustment, the implied AWS baseline value is roughly $1.00 per MHz-POP.

(d) Leap-Verizon.

Leap acquired the A-block license in Chicago for $205 million or $1.58 per MHz-POP.[61]

[61] See press release, *Leap Enters into Spectrum Transactions with Verizon Wireless.* October 9,

While this license involved only one market, it is a market with value at or slightly above the national average. The likely adjustment is likely worth at most a few cents per MHz-POP. This precedent transaction appears to be a competitive and at arm's-length. We estimate it implies an AWS-1 equivalent value of roughly $1.20 per MHz-POP.

2. The AWS Band Precededents

Here we review the baseline AWS precedent transactions. The AWS band has not gone without its own difficulties. In particular, there have been lingering interference concerns, known at the time of the auction, especially in the A-block.

Table 3: The AWS Precedent Transaction Implied Value Of A National License[1]

Deal	Band	Date Announced	Deal Size (Billions)	$ / MHz-POP
Winners - FCC[2]	A-F	Sep-06	$13.9	$0.54
T-Mobile, AWS, Atlantic - Nextwave	A[5]	Jul-08	0.2	0.80
Verizon - SpectrumCo/ Cox TMI	B[5]	Dec-11	3.9	0.85-1.00[3]
T-Mobile - U.S. Cell.	E	Jun-13	0.3	1.77
AT&T-Aloha Partners	A, C[5]	Jan-14	0.8	1.50-3.36

[1] In order to normalize for regional value differences that distort comparison when assessing a regional license transactions as a comparable for national license values, we estimated the implied value of a national license by grossing up the transaction value by the weight of the transaction licenses dollar cost, relative to the total national band footprint cost they represented in their original auction.

[2] Auction 66.

[3] The parties also agreed to various marketing agreements that substantially favor the two cable companies, which we estimate are worth several hundred million dollars given Verizon's dense retail marketing presense on a national scale, which the cable companies lack.

[4] A range is provided for higher confidence because this implied value of a national license estimate stands-out as an outlier. Notwithstanding, the transaction filled a strategic footprint that was high value for AT&T when spectrum availability is scarce.

[5] Primarily.

Source: Data from FCC auction data and the FCC Univeral Licensing System, as well as public company disclosures.

2007 https://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=24516

(a) Auction 66: The AWS Spectrum.

The AWS auction paired 1.7 spectrum with 2.1 spectrum. It took place between 8/9/06 and 9/18/06. The auction raised $13.7 billion or $0.54 per MHz-POP for the U.S. Treasury.[62] It appeared to be a competitive auction with reasonably good participation, including the major carriers. T-Mobile illustrated it was a motivated buyer by bidding $4.2 billion. SpectrumCo., a consortium of cable TV companies bid $2.8 billion, Verizon and AT&T bid $2.4 billion and $1.4 billion, respectively. Several new entrants, including Metro PCS and Cricket communications, also placed billion-dollar bids. It is important to note that auction 66 was a very large auction, with almost 26 billion MHz-POP of spectrum offered across six bands that provided similar enough paired spectrum in 2 x 5 and 2 x 10 MHz configurations. These were fungible enough to spread out demand. Accordingly, we believe supply took a greater than usual toll on auction realizations. Auction 66 occurred a long time ago, so it did not weigh heavily on the 1.4 Spectrum value assessment. It did provide useful insights as to spectrum appreciation over time, to the analysis period.

(b) T-Mobile /ACS/Atlantic/MetroPCS-NextWave.

T-Mobile, in July 2008, announced its agreement with AWS wireless, Atlantic wireless, AWS (MetroPCS) and NextWave wireless, to acquire more than 500 million MHz pops for $150 million or $0.27 per MHz-POP.[63] Based on our estimation to normalize this transaction for the difference in the value of this geography in comparison to the average national license value, the

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[62] (See generally FCC, Summary for Auction 66 (AWS-1), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=66 last visited Jan. 26, 2018)

[63] See press release, *T-mobile USA acquires $98 million in spectrum from NextWave.* July 24, 2008 https://www.tmonews.com/2008/07/t-mobile-usa-aquires-98-million-in-spectrum-from-

transaction implies a national license value of $0.80 per MHz-POP

(c) Verizon-SpectrumCo./Cox TMI

In December 2011, Verizon entered into an agreement to acquire primarily AWS A-block spectrum, from each of SpectrumCo and Cox TMI, for $3.6 billion and $315 million, respectively or roughly $0.74 per MHz-POP for the aggregate $3.9 billion deal.[64] The deal appeared competitive and arms-length. Adjusting for value differences in regional geography, versus the average national license, implies a value of $0.71 per MHz-POP for the national license. Additionally, the parties entered into various marketing agreements. These substantially favor the two cable companies given Verizon's dense marketing presence on a national scale that the cable companies lacked. They are likely worth hundreds of millions of dollars. Adding this to the equation we estimate the transaction was worth roughly $0.85 to $1.00 per MHz-POP.

(d) T-Mobile-US Cellular.

In June 2013, T-Mobile agreed to buy from US Cellular for $308 million or $0.96 per MHz-POP, 10 MHz of AWS Spectrum covering 32 million pops in 29 markets in the Mississippi Valley region.[65] Adjusting to normalize this transaction for differences in the value of this

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nextwave/

[64] See press release, *Comcast, Time Warner Cable, and Bright House Networks sell advanced wireless spectrum to Verizon Wireless for $3.6 Billion.* Dec. 02, 2011 http://www.verizon.com/about/news/press-releases/comcast-time-warner-cable-and-bright-house-networks-sell-advanced-wireless

[65] *See press release, T-Mobile to acquire AWS Spectrum from U.S. Cellular, expanding 4G LTE to 29 key markets in Mississippi Valley region.* June 28, 2013 https://www.tmonews.com/2013/06/t-mobile-to-acquire-aws-spectrum-from-u-s-cellular-expanding-4g-lte-to-29-key-markets-in-mississippi-valley-region/; Also see FCC Form 603 Description of Transaction And Public Interest Statement. File No. 0005848361, Filed 07/12/13 https://wireless2.fcc.gov/UlsEntry/attachments/attachmentViewRD.jsp?applType=search&fileKe

geography relative to a national license, we estimate the transaction implies a value of $1.77 per MHz-POP for the national AWS E-block license. It is important to note, however, that this is a relatively small transaction and accordingly a less reliable indicator of national license value, even while it suggest that value is high.

(e) AT&T-Aloha Partners.

On January 7, 2014, AT&T announced its agreement to acquire for $847 million or $1.50 per MHz-POP, roughly 50 million POPS or 566 million MHz-POPS, of AWS-1 spectrum from Aloha Partners.[66] Adjusting for regional value differences implies a value of $3.26 for a national A-block AWS-1 license. We note that this is a modest deal in terms of POPS, and AT&T is a motivated buyer, which might explain some escalation in the value. Notwithstanding, it illustrates a willingness by AT&T to commit large amounts of money for even small regional purchases. This underscores the appreciating and maybe inflecting value of spectrum at the time of this deal.

3. Conclusions Of Analysis Of Conventional Precedent Transactions.

Based on our analysis we find strong support for an AWS-1 equivalent value in the range of $1.00 to $1.20 during the analysis period, with strong signs of inflection in the rate of appreciation off that base, starting in 2012.

Next, we consider the value impact of impairments.

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y=1108758311&attachmentKey=19167583&attachmentInd=applAttach

[66] See press release, *AT&T Agrees to Acquire AWS Spectrum from Aloha Partners II, L.P.* January 7, 2014 https://www.att.com/gen/press-

B. Precedent Transactions in Encumbered or Unconventional Mobile Broadband Spectrum.

1. Review Of Encumbered And/Or Unconventional Precedent Mobile Broadband Transactions.

The table below lists the transactions we reviewed in unconventional or impaired spectrum.

Table 4: Precedent Transactions in Encumbered and/or Unconventional Licenses

Deal	Band	Date Announced	Deal Size (Billions)	$ / MHz-POP
Qualcomm - Aloha	700 D[1]	Mar-08	$83.0[1]	$0.33[1]
Winners - FCC (Auction)[2]	700 E-Band	Mar-08	$0.7	0.74
Dish - FCC (Auction)[2]	700 E-Band	Mar-08	$0.7	0.55
AT&T - Qualcomm[2]	700 D/E Band	Dec-10	1.9	0.82[3]
Harbinger - SkyTerra[4]	L-Band	Mar-10	1.9	0.27[4]
Dish - DBSB and Terrestar Bankruptcy[5]	2.0 MSS	Jul-05	2.9	0.23
AT&T - WCS	A, C[5]	Jan-14	0.8	0.25-0.38[6]

[1] On or around July 21, 2005, Qualcomm agreed to acquire the Pacifice 700 MHz D-Block REAG that Aloha acquired in auction 44 for at least $83 million or $0.33 per MHz-POP. This license completed Qualcomm's national 6 MHz footprint in the Lower 700 MHz D-Block.

[2] Echostar (Dish) acquired 168 of the 176 E-Block licenses auctioned in the 700 MHz auction 73 in 2008 through their bidding entity Frontier Wireless, later renamed Manifest Wireless. Qualcomm acquired most of the rest, 5 of the top 15 U.S. metro markets.

[3] Normalizing the price to reflect one national license without overlap, we estimate AT&T paid $0.71 per MHz-POP (D-Block equiv.).

[4] On Sep. 23, 2009, Harbinger agreed to acquire the 52% of SkyTerra it did not already own for $5.00 per share valuing all of TerreStar, including net Debt at $1.915 billion or $0.27 per MHz-POP. The transaction closed on March 26, 2010.

[5] Acquired in bankruptcy proceedings and not demonstrative freely competive market sale.

[6] The range reflects the implied national value of WCS based on the Nextwave portion of the transactions The upper bound assumes the value of the C/D blocks, which at the time of the transaction announcement were precluded from mobile broadband, is immaterial.

Source: Data from FCC auction data and the FCC Univeral Licensing System, as well as public company disclosures.

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room?pid=25193&cdvn=news&newsarticleid=37376

(a) Qualcomm - Aloha Partners.

On or around July 21, 2004, Qualcomm announced the acquisition of the Pacific D-Block lower 700 Spectrum license, for an estimated $83 million or $0.33 per MHz-POP,[67] from Aloha Partners. The D-Block license is a 6 MHz unpaired spectrum license. The acquisition was strategic for Qualcomm because it filled in the only region it failed to acquire at auction. Qualcomm disclosed it intention to use the spectrum to provide a mobile video service. While this transaction occurred a long time before our analysis period, it underscores that there was value in unpaired spectrum, even as early as 2004, well before LTE-Advanced.

(b) Auction 73: 700 E-Block Band (and DISH - E-Block Spectrum Acquisition.)

Auction 73, which concluded in March of 2008, offered an unpaired band of 6 MHz in the E-block. A total of $1.3 billion was bid for the entire band or $0.74 per MHz-POP. Qualcomm, won the top 5 markets bidding $555 million or $1.36 per MHz-POP. DISH[68] won the remaining 168 E-Block licenses bidding $712 million or $0.55 per MHz-POP. The E-Block band is an unconventional unpaired band entitled to 6 MHz of downlink only spectrum. DISH acquired it with the stated intentions of providing mobile broadband video services. The licenses are also subject to stringent power and emissions limitations to protect adjacent AWS bands, particularly the 700 Spectrum A-block band.[69] DISH continues to hold those licenses today. [70]

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[67] See AT&T annual report for the year ended 2004 for AT&T's discussion of their spectrum investments; also see generally FCC, Summary for Auction 44 (Lower 700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=44 last visited Jan. 26, 2018)

[68] DISH participated in auction 73 through its bidding entity Frontier Wireless (renamed Manifest Wireless).

[69] (See generally FCC, Summary for Auction 73 (700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73 last visited Jan. 26, 2018)

Accordingly, both pairing and interference are likely considerations in the $0.74 per MHz-POP pricing of the E-block relative to the base-line spectrum. We also point out that this value represents a discount of roughly 40% to the baseline AWS-spectrum value that seems to fall in a range around $1.20.[71]

(c) AT&T - Qualcomm.

On December 20, 2010, AT&T announced an agreement to acquire from Qualcomm its national block of unpaired 700 MHz spectrum in the D and E bands for $1.925 billion or $0.82 per MHz POP. [72] AT&T stated it intention to use this spectrum for supplemental down-link, using carrier aggregation technology, and expected to deploy it once compatible handsets and network equipment were developed. To estimate the implied value of nationwide spectrum, we back out the five metro area E-Block licenses included in the purchase, at their auction 73 cost of $554.6 million ($1.54 per MHz-POP).[73] This leaves an implied value of $1.4 billion for the nationwide 700 MHz Lower D-Block spectrum or $0.71 per MHz-POP. It is supportive of a discount for unpaired spectrum relative to paired in the range of 40%. It also underscores the

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[70] Manifest Wireless (a subsidiary of Dish Network Corporation). "Request for Extension and/or Waiver of Interim Construction Benchmark", FCC's ECFS. Lead Call Sign WQJY944. Jun. 12, 2013.

[71] In April 2011, Coleman Bazelon published a report commissioned by T-Mobile and the CTIA that found the implied discount of the unpaired spectrum compared to paired was around 405. (Bazelon C. *The Economic Basis of Spectrum Value: Pairing AWS-3 with the 1755 MHz Band is More Valuable than Pairing it with Frequencies from the 1690 MHz Band*. The Brattle Group, Washington DC. April 11, 2011.)

[72] Qualcomm, AT&T Agrees to Aquire Wireless Spectrum from Qualcomm(press release), Dec. 20, 2010, http://https://www.qualcomm.com/news/releases/2010/12/20/att-agrees-acquire-wireless-spectrum-qualcomm

[73] (See generally FCC, Summary for Auction 73 (700 MHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73 last visited Jan. 26, 2018)

important role anticipated for LTE-Advanced-Carrier Aggregation and its ability to maximize the value of unconventional spectrum.[74]

(d) Harbinger - Sky Terra.

On September 23, 2009,[75] Harbinger agreed to acquire the 52% of SkyTerra it did not already own for $5.00 per share,[76] that is $1.915 billion or $0.27 per MHz-POP (including net Debt).[77] [78] At the time of the announcement Harbinger already had a controlling position in SkyTerra of 47%.[79] Accordingly, this transaction cannot be considered to be independent and at arms-length. This spectrum was substantially encumbered for mobile broadband applications at the time of the contract between Harbinger and SkyTerra.[80] Accordingly, the transaction

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[74] Bazelon C. The Economic Basis of Spectrum Value: Pairing AWS-3 with the 1755 MHz Band is More Valuable than Pairing it with Frequencies from the 1690 MHz Band. The Brattle Group, Washington DC. April 11, 2011.

[75] The transaction closed on March 26, 2010.

[76] See press release, *SkyTerra Communications, Inc. Announces Going-Private Transaction, Sep. 23, 2009 https://www.sec.gov/Archives/edgar/data/756502/000134100409001951/skyterra_ex99-1.htm*

[77] The total accrued debt as of 12/31/2009 was $1,530.22 million, including Paid-In-Kind Securities, and cash on the balance sheet was $159.5 million.

[78] Based on 23 MHz of spectrum or 7.2 billion MHz-POPS.

[79] TerreStar had 49.062 million voting shares outstanding and 59.958 million non-voting shares. Harbinger owned 22.339 of the voting shares and 29.946 of the non-voting prior to the acquisition.

[80] Regarding the Encumbrance Chairman Furchtgott-Roth stated that "Harbinger was aware that the spectrum it acquired from SkyTerra was substantially impaired for mobile broadband applications. At the time of the contract between Harbinger and Sky Terra in August 2009, Harbinger had no assurance that regulator would allow SkyTerra's spectrum to be used for terrestrial purpose outside of its ancillary terrestrial component ("ATC") license. In order to fall within the ambit of an ATC license, the spectrum had to be used primarily for satellite purposes and handsets had to have a satellite capability, which was not the model LightSquared envisioned. In 2010, the FCC relaxed the restriction on the use of the SkyTerra spectrum by LightSquared. But subsequent interference issues with GPS led the FCC to suspend LightSquared's authority for flexible use of the spectrum" (Furchtgott-Roth H, Sosa D, Stone E. An Assessment of the Economic and Industry Reasonableness of Sprint's Offer for Clearwire. Mar. 2013, pp. 22. http://www.analysisgroup.com/insights/publishing/an-assessment-of-the-

suggests a discount of roughly 70% for spectrum with real barriers to mobile broadband deployment.

(e) DISH - DBSB and Terrastar Bankruptcies.

In 2011, DISH acquired two Mobile Satellite Service (MSS) companies out of bankruptcy, DBSD and TerreStar Networks. Each was settled in separate bankruptcies at $1.4 billion a piece, plus certain settlement expenses to Sprint. In aggregate they invested $2.9 billion or $0.24 per MHz-POP. Each license provided for use of 20 MHz of mobile satellite service (MSS) spectrum nationwide in the 2.0 GHz band and was authorized to offer terrestrial services under Ancillary Terrestrial Authorization (ATC) and satellite services. Full use of this spectrum required regulatory approvals from the FCC to approve the conversion of the spectrum to terrestrial and mobile broadband use. This introduced substantial uncertainty regarding the potential of the 2.0 Spectrum. Without this approval the spectrum was unsuitable for mobile broadband use.[81] [82] These bankruptcy proceedings were characterized by strong knowledge of the bankruptcy process and the most effective techniques, which were employed by DISH to lock-up the licenses and secure a satisfactory price. Even though the proceedings did eventually warrant an auction it is likely that value realization was harmed by the lack of fully competitive market conditions for the spectrum. This value is in line with the SkyTerra value benchmark for a license with significant concerns regarding the potential to gain licensing authority for terrestrial mobile broadband use, at the time of the transaction.

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economic-and-industry-reasonableness-of-sprint-s-offer-for-clearwire/)

[81] DISH 2011 10-K, p. 1, and pp. 5-6.

[82] Furchtgott-Roth H, Sosa D, Stone E. An Assessment of the Economic and Industry Reasonableness of Sprint's Offer for Clearwire. Mar. 2013, pp. 22. http://www.analysisgroup.com/insights/publishing/an-assessment-of-the-economic-and-industry-

(f) AT&T - Nextwave WCS Spectrum.

On August 2, 2012, AT&T announced several simultaneous acquisitions to consolidate a large nationwide footprint of AWS licenses. These included agreements with Nextwave Wireless, Comcast, Horizon and San Diego Electric and Gas. For the Nextwave Wireless component, it agreed to pay $650 million in debt and equity after contingency payments or an estimated $0.25 per MHz-POPS[83] for Wireless Communications Service (WCS) and Advanced Wireless Services (AWS-1) licenses in 608 CMAs. [84] We estimate an upper bound value of $0.38 per usable MHz-POP, assuming conditions proposed to the FCC. Absent the approval of AT&T's proposed conditions to the FCC the WCS spectrum is severely impaired and not suitable for mobile broadband. Accordingly, the WCS value benchmark has a similar characteristic, in this respect, to the SkyTerra and DBSB/TerreStarNetworks bankruptcy transactions.

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reasonableness-of-sprint-s-offer-for-clearwire/

[83] Based on our estimates and adjustments to account for non-WCS spectrum.

[84] "In the CMAs in which AT&T is acquiring WCS spectrum, post-transaction AT&T would hold 10-30 megahertz of WCS spectrum, including 20 megahertz of WCS A and B Block spectrum in 535 CMAs." Applications of AT&T Mobility Spectrum LLC, New Cingular Wireless PCS, LLC, Comcast Corporation, Horizon Wi-Com, LLC, NextWave Wireless, Inc., and San Diego Gas & Electric Company For Consent To Assign And Transfer Licenses, WT Docket No. 12-240, Memorandum Opinion And Order. Dec. 18, 2012. Our $0.25 per MHz-POP estimate reflects an estimate of $0.22 paid for only Nextwave's portion of WCS licenses at estimated 2011 population levels, which we determined after adjusting for AWS-1 holdings at values implied by the T-Mobile transaction with a margin for appreciation; Also see press release, *AT&T Agrees to Acquire NextWave Wireless, Inc.*, Aug. 2, 2012 https://www.att.com/gen/press-room?pid=23161&cdvn=news&newsarticleid=34976.

2. Conclusions Regarding Encumbered And/Or Unconventional Precedent Mobile Broadband Transactions.

The encumbrances and/or unconventional spectrum we reviewed fall into two categories, those that require the new LTE-Advanced-Carrier Aggregation technology to harvest their full potential (the "technology encumbrances"), and those that carry significant risk regarding the ability to gain FCC authorization for mobile broadband use (the "authorized use encumbrances"). Our analysis suggests a discount in the range of 40% for the technology encumbrances and a discount in the range of 70% for the authorized use encumbrances. We also observed various transactions that suggest insider deals, which could have eliminated some incentive to pay more.

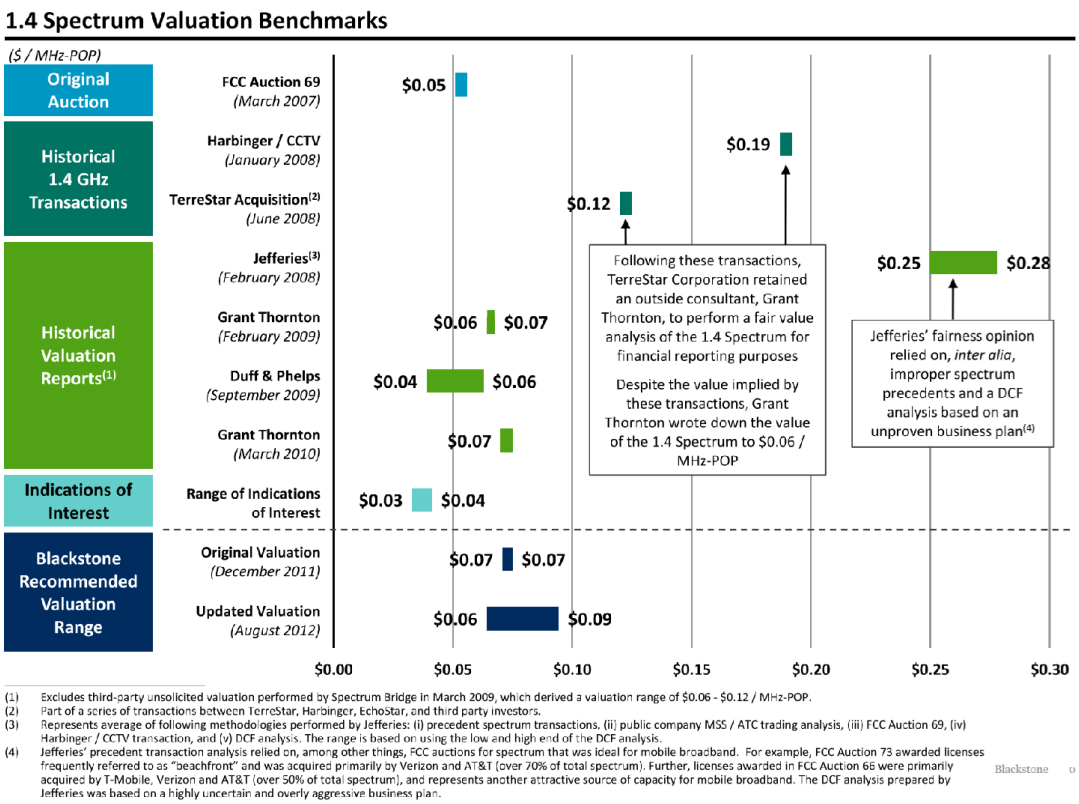
In closing we propose that an evaluation of a nonbaseline license could require adjustments for frequency-band, technology encumbrance, as well as the authorized use encumbrance with respect to the serviceable population affected. An adjustment might also be merited for an immature band ecosystem, which likely incorporates bands that are not contiguous. We might add that these factors are not necessarily additive, because they may apply to one expectation scenario, but not to another. Accordingly, how encumbrances are weighed is also an important factor and the analysis needs to be considered holistically.

In the next section, we focus on those transactions that involved the history of the 1.4 Spectrum. Because it reflects the asset under study, and to the extent we can remove the noise in the transactions, it has the potential for providing useful value information.

C. Precedent Transaction Benchmarks Involving The 1.4 Spectrum.

The history of the 1.4 Spectrum involves a series of transactions between insiders that lacked independence. The value benchmarks they produce must be considered with a discerning eye. The TSC valuation expert's table below provides a reasonable accounting of most but not all of the relevant value benchmarks involving the 1.4 Spectrum.

Exhibit 12: 1.4 Spectrum Valuation Benchmarks Submitted By The Valuation Expert On Behalf Of TSC's Bankruptcy Plan



Our analysis reflects a slightly different goal of "following the money". The focus is the

assessment of the real economic commitments made or surrendered that can be mined from the terms agreed to in the various 1.4 Spectrum related commitments. This makes it possible to assess the decision makers priorities. The analysis encounters various disparities in the benchmarks produced by the valuation expert that contrast with our analysis. Generally, our analysis illustrates benchmark value is higher than that put forth by the TSC valuation expert.

The various transactions involving 1.4 Spectrum are dissected below.

1. Auction 69: 1.4 Spectrum Auction

The 1.4 GHz auction concluded on March 8, 2007. It raised $123 million or $0.05 per MHz-POP. The auction did not illustrate characteristics of a competitive value maximizing auction and should not be relied on as a value-maximizing benchmark. Only nine bidders participated in the auction. None of the major national carriers participated. Only Port L.L.C., and CCTV Wireless Inc., and possibly L-Tron, had capacity to bid $100 million or more in aggregate. No other bidder appeared to have the capacity or intention to place bids totaling even $20 million in aggregate.[85] Accordingly, there was limited financial capacity to create competition and the two winning bidders split the licenses evenly. Bid levels did not reach competitive market levels. This limited participation and skewed financial fire-power between the two winning bidders and everyone else, made it easy to signal in the bidding behavior to support evenly dividing the license bids. This likely prevented price inflating competition by the

[85] (See generally FCC, Summary for Auction 69 (1.4 GHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=69 last visited Jan. 26, 2018)

two winning bidders, especially in the larger EAG markets.[86] While the fragmented offering of licenses, in narrow configurations, may have deterred more bidders from participating in the auction.[87] By round 26, only one potential competitive bidder remained active. This bidder placed bids generally between $200 and $300 thousand. By concentrating all of its capacity on one market at a time, then moving on to the next when capacity to win that market was exhausted, this bidder was able to affect the price in several smaller markets. Accordingly, the smaller markets, unpaired 2 MHz bandwidth metropolitan economic area (MEA) licenses, realized higher values per MHz-POP. Several of these small markets reached mid-high teens per MHz-POP levels, even while the presumably more desirable paired large region bands realized $0.05 to $0.07 per MHz-POP. This realization would suggest a potential national license value for the auction several multiple above the levels actually realized, were the auction more competitive. Nevertheless, consolidation of all licenses in the hands of only two winners, and all of the spectrum in any given market in the hands of only one owner, meant each auction winner had an 8 MHz block of spectrum for a large contiguous region of geography. This made the licenses immediately more valuable upon the conclusion of the auction than they were at the start of the auction. The consolidation of the the Port LLC and CCTV Wireless holdings a year later

[86] The pattern of bidding seemed to confirm the lack of competitiveness in the auction. By the eleventh round, the two bidders with capacity to buy all of the licenses appear to have signaled through their activity that they were willing to split the nation rather than continue to go tit-for-tat and continue to drive the prices higher. There was a strong suggestion of collusion in the auction, even if it did not cross a boundary of improper behavior. Even though this continued until round 267, the auction was effectively locked up between the two winning bidders by the 16th round. (See generally FCC, Summary for Auction 69 (1.4 GHz Band), http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=69 last visited Jan. 26, 2018).

[87] Sixty-four licenses were offered, including 52 that gave the right to use 2 GHz of unpaired spectrum in each of 52 major economic areas (MEAs), and 12 licenses consisting of two 3 MHz of 2 x 1.5 MHz paired spectrum licenses in each of six economic area groupings (EAG) regions. The fragmentation, according to comments submitted to the FCC, may have diminished the

would make the spectrum even more valuable in forming one national footprint.

2. The CCTV Wireless Investment By Highland and Solus.

CCTV Wireless sold roughly one-third of its ownership to new investors, that included Highland, Solus, and other undisclosed parties, right around the final payment deadline for the 1.4 licenses that CCTV provisionally won in the 1.4 Spectrum auction. The proximity of the investment to the payment deadline suggests it was a capital raise to fund the $66. 1 winning bid, of which $52.9 was still owed. If the new investor group did provide all of the required capital, that would imply a $159 million valuation for the roughly half of the US population of the CCTV licenses and would accordingly have been valued at $0.14 per MHz-POP. In addition to Solus and Highland, the control group of CCTV included Raj Singh and Columbia Capital, whom also had a history as insiders of TSC.

3. Harbinger - CCTV

Harbinger's agreement to acquire an option from CCTV is listed here because it is presented as a separate value benchmark by the TSC valuation expert. Notwithstanding, we do not consider Harbinger's $50 million purchase of the option to acquire CCTV for $165.5 million to be a component severable from the Master Agreement. Instead, we consider it a critical component of the larger multi-step Master Investment. Harbinger's involvement appears more as middle-man or agent, with respect to the CCTV stake, not an outright purchaser. Note that the

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value of the auction to prospective bidders. (Id.)

option agreement was entered into on January 30, 2008, and the Master Agreement six days later on February 5, 2008. More importantly, the Master Agreement was under discussion since mid-2007, and in draft form since at least December 2007.[88] From an economic perspective, it appears that Harbinger is simply providing TSC with the financing it needs to acquire the CCTV license it wants for cash. Whether he delivers that money to TSC, so TSC can pay the CCTV owners for the licenses, or pays CCTV so he can deliver the licenses to TSC instead, is largely irrelevant. Notwithstanding, the transaction involves an agreement by Harbinger to deliver cash payment of $212.5 million or $0.19 per MHz-POP so CCTV's spectrum can be owned by TSC.

4. TerreStar Acquisition.

The TSC acqusition provides two value benchmarks. It provides the value benchmark just described in the Harbinger - CCTV transaction related to the option agreement for the 1.4 Spectrum. It also implies a benchmark based on what the control operators in the transaction are willing to contribute in exchange for the acquisition of a roughly 44.4% (roughly one-third, fully diluted) controlling stake in TSC. To evaluate the transaction properly, it is important to look at the investment from the perspective of the control investors who are buying controlling stakes in assets, not stocks. We know from the previous discussion that the 1.4 Spectrum is valued at $212.5 million for 50% of the entire national footprint. We have to assume the Port L.L.C. spectrum reflects the same value in the absence of information to the contrary. On this basis

[88] See background in the information statement prepared for the Master Investment announced February 5, 2012. (United States. SEC. Edgar. TerreStar Corp Form Def 14C (Information Statement-All Other (Definitive)). N.p.: n.p., Filed 05/19/08 for the Period Ending 05/20/08. pp. 3-4. Edgar. Web. 10 Oct. 2017.)

Harbinger and DISH contribute $425 million in value for their roughly 40% acquisition of TSC. This implies they paid $7.03 for the controlling stake, which reflects a premium, which is not unusual in acquisitions of controlling stakes. The table below illustrates the calculation.

Table 5: The TerreStar Price Per Share Implied By The TerreStar Master Investment

	(In mil.)
CCTV contributed 2/5/09 by Harbinger for Terrestar.[1]	$212.50
Terrestar shares received on conversion of CCTV[2]	30.00
Implied value of Harbinger control Transaction	$7.08
Terrestar share price 02/04/08	$ 5.30
Premium paid for control transaction	34.0%

[1] Harbinger acquired the option to buy CCTV for $212.5 million, six days prior to announcement of the TerreStar Master Investment, which relied on the contribution of the CCTV investment,and from parties privy to the months long discussions for the investment.

[2] 30 million shares at market value on 2/4/08 $ 159.00

[3] Terrestar traded in a band of $4.30-8.20 during Dec. and Feb 08.

Source: SEC filings, company disclosures, other public information.

Neither the market price, which is around $5.35 around the time of the transaction, or the $5.57 exercise price on the exchangeable notes, has any relevance to the determination of the value of the 1.4 Spectrum. It is unlikely the control investors thought of the value received in TSC as simply 30 million shares at $5.35 or $5.57 or $160 million. To help illustrate the motivations of the control investors, consider that in agreeing to pay $212.5 million, Harbinger

was choosing to immediately lose $52 million if they believed they were buying the market value of the shares. It is unlikely Harbinger rationalized their investment this way. It is more likely that the market for the size of investment Harbinger and DISH were seeking in TSC, was simply not executable at the $5.35 market price and without increasing the share float. It is worth remembering that this transaction was created by Harbinger, which already owned roughly 38% of TSC's shares before the Master Investment. It likely had a lot of influence in structuring a transaction that would not be detrimental to them.

(a) A proper value per pop benchmark for 1.4 Spectrum in the master investment.

The appropriate benchmark for the 1.4 Spectrum in the CCTV and Port acquisitions is $0.19 per MHz-POP. This valuation disagrees with the TSC valuation expert's assessment of $0.12 per MHz-POP.

Table 6: The Master Investment Exchange Value of the 1.4 Spectrum

	(In mil.)	
CCTV contributed 2/5/09 by Harbinger for Terrestar.[1]	$212.50	[2]
MHz-POPs of 1.4 Spectrum held by CCTV	1,136.83	[2]
Implied Value Per MHz-POP	$ 0.19	

[1] The option on CCTV was acquired, six days prior to its contribution in the TerreStar Master Investment, for $212.5 million, which investmetn involved months of discussion.

[2] The market value of the 30 million shares of Terestar Harbinger received in exchange for CCTV was $159.

Source: SEC filings, the FCC Universal Licensing System, and other public information.

Source: SEC filings, the FCC Universal Licensing System, and other public information.

(b) The implied spectrum valuation for the TerreStar Acquisition.

Accordingly, the $425 million in value Harbinger and DISH contributed in 1.4 Spectrum, for 60 million shares of TSC pro forma, implies the 1.4 Spectrum plus 2.0 Spectrum TSC will own after the Master Investment is valued at $0.21 per MHz-POP. It illustrates consistency in the value per MHz-POP with the 1.4 Spectrum acquisition, which suggests the entire deal was structured around the range of $0.19 to $0.21 per MHz-POP.

Table 7: 1.4 and 2.0 Spectrum Value of TerreStar Master Investment

	As of 3/31/08[1]
Shares Out. (Fully Diluted)	180 [2, 3, 4]
x Implied Price of Master Investment	$ 7.08
Total Equity Capitalization	$ 1,275
+Debt and Preferred Claims	1079 [2, 3, 4]
- Cash	-492 [5]
Total Capitalization	$ 1,861
-Satellite/Other Operating	-250
Total Capitalization of Spectrum Assets	$ 1,611
MHz-POPs of 1.4 and 2.0 Spectrum (28 MHz nationally)	7,840
Transaction Implied Value Per MHz-POP	$ 0.21

[1] The first reporting period after the master investment.
[2] Dilution from options/warrants assumes share buybacks with exercise proceeds.
[3] Junrior Preferred Series E as converted into 30 million shares.
[4] Exchangeable notes as converted into 28 mil. Shares at $5.57.
[5] Reflects the 44.3 million shares of Sky Terra sold for $200.4 million in 2008.
Source: SEC filing and company disclosures.

(c) Evaluating net assets given up for net assets received.

The following tables provide some insight regarding the change in claims on the assets as a result of the Master Investment. First, we present the table below, which illustrates how the master investment affects the ownership structure.

Table 8: TerreStar Ownership As Of Master Investment

	Before		Change[2, 3]		After		Series A/B Cv.Pfd.[4,9]		Exch. Notes[4, 10]	
Harbinger[2, 3, 4, 9-10]	36.514	41.1%	38.970	44.8%	75.484	42.9%	0.145	35.5%	0.050	33.3%
Echostar[2, 3]	-	0.0%	38.970	44.8%	38.97	22.2%		0.0%	0.050	33.3%
Solus[3, 7-10]	6.725	7.6%	4.037	4.6%	10.762	6.1%	0.085	20.9%	0.017	11.1%
Intrepid	5.814	6.5%	-	0.0%	5.814	3.3%	-	0.0%	-	0.0%
Tudor	5.688	6.4%	-	0.0%	5.688	3.2%	-	0.0%	-	0.0%
Goldman	4.608	5.2%	-	0.0%	4.608	2.6%	-	0.0%	-	0.0%
BCE	4.531	5.1%	-	0.0%	4.531	2.6%	-	0.0%	-	0.0%
Other[3, 6, 9-10]	24.980	28.1%	4.933	5.7%	29.913	17.0%	0.178	43.6%	0.034	22.2%
Total	88.860	100.0%	86.910	100.0%	175.77	100.0%	0.409	100.0%	0.151	100.0%
T. Equ. Sh.	88.860		86.910		175.77		12.255		27.187	

[1] Data per Terrestar 14C as of 5/19/08.

[2] Harbinger and Echostar will receive 30 million shares each on execution of the spectrum agreements.

[3] 8.97 shares equiv. each on conv. of $50 million exhangeable notes, to Harbinger, Echostar, and Solus/Other.

[4] Amount in shares, each which has a face value of $1000 .

[5] Harbinger has a 4.397 beneficial interest in warrants and preferred or 35.5% of the company aggregate preferred and related warrants issued. These convert into common stock at 30 shares each, which we estimate represents 0.145 Series B cv pfd (its post bankruptcy ownership of 31.04, assumed by Westface, implies Harbinger owned only 0.127 Series B Pfd. Shares at the effective date of the bankruptcy.

[6] Highland is known to own all 90,000 shares of Series A cv. pfd. (its postbankruptcy ownership implies Highand owned only 0.789 shares on Series A, Cv. Pfd. on bankruptcy effective date), included in other.

[7] Solus' owership of series B preferred is assumed to be the same as its ownership post bankruptcy of 20.93%.

[8] The Series B Cv. Pfd. ownership of Other is estimated as the residual after deduction Harbinger, Solus, and Highland ownership estimates from the total.

[9] The distribution of estimated convert. preferred differs slightly from TerreStar postbankruptcy ownership, which was distributed pro-rata to preferred shareholders (Harbinger 31.04%, Highland 19.31%, Sola 20.93%).

[10] We estimate the 50 million of exchangeable notes not issued to Harbinger/Echostar are equally distributed among Solus, Highland, Others, in line with the distribution of the convertible preffered issue.

Source: SEC filings and FCC Universal Licensing System and Electronic Comment Filing System.

In the second table, we illustrate the flow through ownership in net spectrum MHz-POPS for each control investor, before the Master Investment and thereafter.

Table 9: TerreStar Investment Flow-Through Ownership Analysis

	MHz-POPS Contributed				Pro Forma	MHz-POPS Attained	
	CCTV/ Port 1.4	TRSTR(%) [1]	Attrib. Terrestar 2.0	Total Attrib. POPS	TRSTR (%)	Total Attrib. POPS[2]	Δ in Net POPs
Harbinger	-	41.1%	2,301	2,301	42.9%	3,350	1,049
Echostar	1,100	0.0%	-	1,100	22.2%	1,729	629
Solus/Highland	1,100	12.5%	701	1,801	10.4%	808	(993)
Other	-	46.4%	2,598	2,598	24.5%	1,913	(685)
Total	2,200	100.0%	5,600	7,800	100.0%	7,800	-

[1] Based on 180 million fully diluted shares, proforma for the master investment and spectrum agreements. Exchangeable notes, but not the series A/B convertible preferred, are as converted.

[2] Terrestar NetDebt is $0.08 per MHz-POP at 3/31/08, pro forma for the master investment, the spectrum agreement, and the sale of the SkyTerra stake.

Source: SEC filings and FCC Universal Licensing System and Electronic Comment Filing System.

Notice that DISH increases its net MHz-POP ownership by roughly 55%. More telling is the relative mix of POPS owned before and after, which suggests the transaction allows DISH to swap its interest in 1.4 Spectrum MHz-POPS for an even amount of 2.0 MHz-POPS. They also retain a carried interest in a residual share of 1.4 Spectrum that roughly offsets the incremental debt assumed in taking an ownership interest in the levered TSC. Harbinger also increases its net MHz-POPS, which cost them $212.5 million paid in the CCTV conversion. Highland and Solus are diluted. Notwithstanding, the structure of the CCTV transaction's option and exercise agreement with the auction winners suggests the deal was structured to provide Highland / Solus with an attractive one-year return on the 1.4 Spectrum. Only the minority shareholders appear to be less well-off. Their net spectrum flow-through ownership has been substantially diluted.

(d) The control investors are highly leveraged to realizations at higher MHz-POP valuations.

The table that follows provides some perspective on the leverage in TSC exit scenarios at various values per MHz-POP.

Table 10 - Terrestar Control Investor Simple Exit Value Scenario Analysis[1]

(in millions)			
Realized $ / MHz-POP	$ 0.20	$ 0.35	$ 0.50
Total MHz-POPs of 1.4/2.0 Spectrum	8,624	8,624	8,624
Spectrum Value	$1,725	$3,018	$4,312
Add: Satellite Ecosystem	250	250	250
Total Private Enterprise Value	$1,975	$3,268	$4,562
Less: Net Debt	-587	-587	-587
Total Private Equity Value	$1,388	$2,681	$3,975
Shares Outstanding, Fully Diluted	180	180	180
PMV/Shares	$ 7.71	$ 14.90	$ 22.08

[1] MHz-POPS in the analysis period.
Source: Proprietary estimates, company disclosures, and other public information.

It is a simple format presentation of exit scenarios at various prices per MHz-POP to provide the baseline of potential value realization the control group may be considering. The analysis provides a good illustration of potential upside, as well as the significant amounts of leverage that exist in this control investment opportunity. It further underscores this investment was made for future-looking exit valuations on net assets, and not day one marked-to-market common share value.

D. Conclusion

On the basis of our assessment of a baseline spectrum value, and considering the relative pricing of various encumbrances and nonconformities, we conclude the following:

1. The 1.4 Spectrum is worth $0.28 to $0.38 per MHz-POP.

This range reflects confidence that it is reasonably likely a transaction could be effectuated within that range over a reasonable marketing period. It incorporates what has been known about the license concession since auction including configuration, permitted use, and rules regarding power and emissions. It does not attempt to quantify the damaging incremental market impact or discount that might apply due to TSC's and/or its control group's spin on the RKF report, in other words, how it impacts perception and leverage as might occur when an agent for a seller tells a buyer their asset is inutile. This discount does not lend itself to measurement and is not appropriate because it is after-the-fact, and introduced as a closing effort.

As we concluded earlier the baseline spectrum is worth at least $1.10 to $1.20, with signs of acceleration in the rate of spectrum appreciation. A technology impairment discount seems appropriate because the 1.4 spectrum depends on the anticipated LTE-Advanced-Carrier Aggregation technology for its best use. This captures the lack of spectrum contiguity that is resolved with Carrier Aggregation technology as well. This condition is similar to that of the unpaired spectrum and so a comparable discount seems appropriate.We observed in Section III. B. the technology impairment discount was roughly 40%. We also address the issue of perceived exclusion zones raised by RKF. Some of the exclusion population is alleviated with technology anticipated in the next few years. Accordingly, we apply the 70% authorized use encumbrance

factor, using RKFs 20% exclusion scenario in adjusting serviceable 1.4 Spectrum MHz-POPs. We also consider that the 1.4 Spectrum should have better propagation characteristics than AWS because of its location on the radio frequency spectrum, though make no adjustment for frequency band advantage. Jarvinian suggests the 1.4 Spectrum is very high-value spectrum because of low noise,[89] and we consider this a margin of safety in our valuation. We also factor a discount for lack of developed eco-system in the 1.4 Spectrum band which is worth 10-20%. Lastly, we factor in a marketability discount of 25%-35%. This reflects the reality that the timing of a carriers appetite for the 1.4 Spectrum, and the intention to sell the 1.4 Spectrum, may not line up. It reflects a genuine motivation to sell during a reasonable marketing period. This factor reflects an attractive enough discount to increase the appetite of likely parties of interest to commit during the selected marketing period. This results in our range of $0.28 to $0.38 per MHz-POP. For further confidence, we submit that the low end of the range falls just above the implied prices of the most encumbered transactions that we reviewed, those that faced serious doubts regarding ultimate authorization to provide mobile broadband when their respective transactions were disclosed. They also tended to be related party transactions that did not require the buyers to bid full market price.

2. The TerreStar Corporation equity value is in a range of $1.25 to $3.05 per share.

By extension, we extrapolate the value of the 1.4 Spectrum to estimate a value of TSC.

[89] Jarvinian. *Securing the value and the negotiability of the TerreStar 1400 Asset. TerreStar Board Presentation, Sep. 2013. U.S. Bankruptcy Court, 10-15446, Doc 1158-1, filed 01/09/14 pp. 6-9; Also see the Ex-Parte presentation to the FCC. (*Jarvinian. "An Integrated Spectrum Solution For L-Band (Presentation to the Federal Communications (FCC)" Mar. 14. pp. 10-11. http://https://www.fcc.gov/ecfs/filing/6017609284)

The table below provides a scenario analysis of the TSC total equity value and value per share, at various exercises prices within the range of our valuation for the 1.4 Spectrum.

Table 11: TerreStar Control Equity Valuation

(in millions)	Low	Mid	High
MHz-POPs of 1.4 Spectrum[1]	2,464	2,464	2,464
$ / MHz-POP	$ 0.28	$ 0.33	$ 0.38
Total 1.4 Spectrum Value	$ 689.92	$ 813	$ 936
Less: Total Claims Against on Effective Date	(516)	(516)	(516)
Total Private-Market Equity Value[2]	$ 174	$ 298	$ 421
Total Shares Outstanding	139	139	139
PMV/Share	$ 1.26	$ 2.14	$ 3.03

[1] Reflects ownership of all the 1.4 spectrum providing 8 MHz of national spectrum coverage.

[2] Assumes the satellite orbital slot (with $25-$40 million of potential value) is worth zero.

Source: Proprietary estimates from FCC filings, company disclosures, and other public information.

We now address some final items.

IV. CLOSING: IS THE GRIEVANCE OF THE MINORITY DISSENTERS JUSTIFIED?

The bankruptcy was very punitive to the minority shareholders. Their interest in TSC was completely wiped out. In this sense harboring feelings of mistreatment seems perfectly justified. The control investors, like the minority shareholders, also had their equity interest in the bankrupt TSC wiped-out. Unlike the minority shareholders, they had the ability to steer the bankruptcy and convert their basket of old claims, into new claims. That protected a material portion of their existing control of TSC's net assets. In the case of DISH, net assets were materially increased at seemingly insider rates on the basis of price per MHz-POP.

Whether such activity represents an enforceable legal violation against the rights of minority shareholders by controlling stakeholders, is outside of the scope of this report. Competent advice in this regard likely requires expertise in fiduciary law, SEC law, bankruptcy law, and/or other arenas of law. Notwithstanding, we outline points that may worthy further consideration, particularly with respect to decisions that suppressed potential inclusion of information that might reasonably be expected to be known, and might suggest value or structures sufficient to satisfy all senior claims and provide some recovery to the minority shareholders.

We conclude our report with the following topics that might be worthy of further exploration with competent advice.

A. Did Controlling Stakeholders Have Cause To Believe in a Positive Equity Outcome?

The controlling stakeholders include leading players in the mobile broadband and satellite industries. They include members that are aggressive participants in the industry standards-setting process, including membership in 3GPP, the industry standard setting organization. They are also active participants in pushing for regulatory reform to repurpose spectrum for mobile broadband use. Accordingly, it is reasonable to expect they would be as informed as anyone as to the state of the industry and spectrum markets, its competitive dynamics, as well as the motivations of various players in the industry to aggressively build spectrum capacity in the face of exploding demand and constraints on spectrum supply. Likewise, they are as informed as anyone, about the future opportunities that industry participants are pricing into spectrum prices in the analysis period. The hurdle of $515.5 million in claims and $1.8 million in preferred interest per month in accruals or roughly $0.0075 per MHz-POP per year, seems surmountable. In light of the various transactions that were taking place during the analysis period and escalating increases in prices paid for spectrum, it is hard to conclude that the controlling stakeholders had reasonable confidence that a value-maximizing transaction involving the 1.4 Spectrum, one that would also provide recovery for the minority shareholders, did not have a reasonable possibility of occurring. None of the evidence submitted in the bankruptcy we reviewed so far suggests otherwise.

B. Certain Actions Of Management, Directors, And/Or Controlling Stakeholders, Directly Prejudiced The Interest Of The Minority Investors.

We note that the position taken by TSC and its controlling stakeholders in the bankruptcy

proceedings, in many ways seemed to prejudice the interest of the minority shareholders for their benefit, including: (a) opposition to the creation of an equity committee, (b) opposition to the appointment of an independent examiner to value the 1.4 Spectrum, (d) interpreting previously known information in a form damaging to the potential realization of value, (e) interpreting value benchmarks in a way that either ignored real value or involved matters that were not evidence of market based transactions, and (f) relying on a purported marketing that had few characteristics of a genuine effort to support success. While we already opined that the marketing process displayed few characteristics of a genuine intent to realize fair market value, the commission of the RKF engineering report, in the final 'innings' of the bankruptcy, along with the choice of valuation benchmarks deserve further mention.

1. The RKF Report Was Prejudicial To Minority Shareholder Interest.

The commissioning of the RKF report that the bankruptcy court approved on July 9, 2012, and RKF produced on July 13, 2012, offered no information that was not disclosed prior to the original auction of the 1.4 Spectrum. The license configuration and rules regarding power and emissions were not new. They were well known at auction and at the time of the various transactions involving the spectrum that included the controlling stakeholders. Those stakeholders were willing to pay $0.19 per MHz-POP, and that involved deals that did not have the characteristics of market-based transactions and did not require them to bid full market price. The new information was that they interpreted the spectrum as damaged. This interpretation they submitted as evidence of a low 1.4 Spectrum value as part of the confirmation process, which the court relied on in confirming the plan at a value at $0.07 to $0.09 per MHz-POP. The TSC

valuation expert in his testimony concluded as to what the 1.4 Spectrum "cannot be used for, which is mobile terrestrial service."[90] Our own reading of the RKF report does not identify an RKF conclusion that it cannot be used for mobile terrestrial service. [91]What could constitute new value impacting information that an efficient market might consider in making incremental adjustments to the expectations it weighs in assessing the value of the 1.4 Spectrum, however, is the adverse opinion by the owner of the 1.4 Spectrum themselves. Whether or not TSC had an obligation to share a negative opinion or interpretation regarding the potential use of the 1.4 Spectrum ahead of the value-maximizing marketing effort for its stakeholders, is a valid question. We do observe that members of the controlling stakeholder group in their capital raising and license repurposing activities, regarding other spectrum assets they controlled, particularly, the 1.6 Spectrum controlled by Harbinger, kept carefully under wraps much more significant knowledge that raised very legitimate doubts those spectrum bands might ever be used for mobile broadband service. Whether the RKF report represents a talking down of the value of the 1.4 Spectrum ahead of the purported marketing and confirmation hearing and/or constitutes a violation of minority shareholder interests or fiduciary obligation might be worth exploring.

2. The Selection And Interpretation Of Value Benchmarks Appear To Misrepresent Economic Reality (See Exhibit 12 - section III. C.)

In section 3. C we discussed our conclusion that the interpretation of value benchmarks

[90] See transcript of the confirmation hearing: (TerreStar Corporation, et al. Debtors. Hearing re: Doc. #513 Confirmation Hearing. [New York] United States Bankruptcy Court, 11-10612, Doc 675, filed 10/23/12, pp 93.

[91] *TerreStar 1.4 GHz Market Study*. RKF Engineering. 10 July 2012.

deriving from the various 1.4 Spectrum transactions materially undervalued the true economic reality of these transactions. We noted earlier that the 1.4 Spectrum auction did not provide a competitive market auction suitable for reliable value inferences. We also noted that the more appropriate value benchmarks to be derived from the various components of the master investment into TerreStar for the 1.4 Spectrum, and the 2.0 Spectrum were in a range of $0.19 to $0.21 per MHz-POP. This was a significant differential to the $0.12 range referenced by the valuation expert. We also disagree with conclusions that the Jefferies work is not worth considering. We do not know how or what modifications to the Jefferies comparables the valuation expert did adjust to formulate their approach to a comparable mobile broadband universe, [92]so that it conforms to his thesis that this spectrum is not suitable for mobile broadband use. To that, we add our observation that none of the internally commissioned valuations by Grant Thornton and Duff & Phelps in 2009 and 2010 appeared to be conducted for the purpose of determining the realizable value of the 1.4 Spectrum in a market-based transaction. Instead, they appear to be commissioned for the purpose of GAAP accounting book value determination.[93] It is not likely informed industrialist in the market of control transactions would consider such valuations as a reliable assessment of market value. While we are not privy to the weight of these various components in the TSC valuation expert's overall determination of value, they do present a pattern of analysis that could be worth exploring further.

[92] See table of third-party spectrum transactions in Jefferies fairness opinion of the Master Investment announced February 5, 2012. (United States. SEC. Edgar. TerreStar Corp Form Def 14C (Information Statement-All Other (Definitive)). N.p.: n.p., Filed 05/19/08 for the Period Ending 05/20/08. Pp. 20. Edgar. Web. 10 Oct. 2017.)

[93] See transcript of the confirmation hearing: (TerreStar Corporation, et al. Debtors. Hearing re: Doc. #513 Confirmation Hearing. [New York] United States Bankruptcy Court, 11-10612, Doc 675, filed 10/23/12, pp 67-68.

C. There Were Potential Full Recovery Alternatives That Would Not Wipe Out Equity Holders.

The final resolution of the bankruptcy reflected a take-private transaction by the controlling stakeholders. It relied on prior claims existing in their Series A and B preferred shares. Of the $515.5 million claim calculated through the effective date of the bankruptcy, the preferred stake represented the lions share. Upon the effective date of the bankruptcy, the company emerged with very little debt and the preferred shareholders received all of the equity.

Ruling out that no believability of a value realizing transaction was justified, i.e. one that would sufficiently satisfy all claims and provide some or complete recovery to the equity class, we consider whether it is worth exploring whether the structure of a take-private transaction that eliminates all of the minority shareholder claims on the assets, did not violate the interest of the minority shareholders, or the fiduciary obligations by TSC and/or its controlling stakeholders.

D. Where Actions Of TSC And/Or Its Controlling Stakeholders Premeditated?

It may be very difficult to determine correctly, especially given the certainty of hindsight vis-a-vis a reality of an uncertain future when these decisions were being made, whether the actions that resulted in the transfer of control of former TSC assets to various members of the prior controlling stakeholders reflected premeditation. We do observe that the controlling stakeholders are sophisticated and savvy financiers and operators in the markets for control investments. They also appear to have significant experience in bankruptcy and workouts. However, while the potential of the scenarios that did unfold were not likely outside their realm

of future possibility when these controlling stakeholders made their financial commitments, whether their actions to demand sufficient collateral in exchange for their financial commitments were prudent action to protect their investment, or a 'Machiavellian' scheme to raid the assets of TSC would be difficult to determine with certainty.

To gain a better perspective, it might be worth considering the distribution of the claims on the various assets that arose throughout the history of the various capital raises of TSC. These would include the various potential bankruptcy fulcrum positions they created on various assets (a) at the corporate level through the purchase of the preferred shares that were controlled by Highland, Solus, and Harbinger; (b) at TSN, the direct holder of the 2.0 Spectrum and satellite assets, through the purchase of the exchangeable notes issued in the 2008 Master Investment, controlled by Harbinger and DISH, and the issue of the senior notes in 2007 plus add-on purchases by DISH in 2008 in the Master Investment. These transactions created by 2008, a picture of who had claims on what asset that remained largely in place throughout. Various other transfers between insider controlling stakeholders are also worthy of examination including, but not limited to, the sale of SkyTerra to Harbinger in 2010, the 1.4 Spectrum lease with Harbinger and its subsequent default, the internal transfers of the prepayment received on that lease from TSC to TSN, as well as the engagement of TSC's bankruptcy adviser six to nine months prior to filing bankruptcy.

E. Proper-Conduct/Obligations Of Directors, Management And Controlling Stakeholders Towards The Minority Interest.

Did TSC and/or the controlling stakeholder group have an obligation, fiduciary or

otherwise, to protect the interest of the minority shareholders. Was that obligation, if it did exist, affected by the bankruptcy filing?

F. Do The Minority Shareholders, Who Had Their Ownership Wiped Out In A Take-Private Transaction In Bankruptcy, Have A Claim?